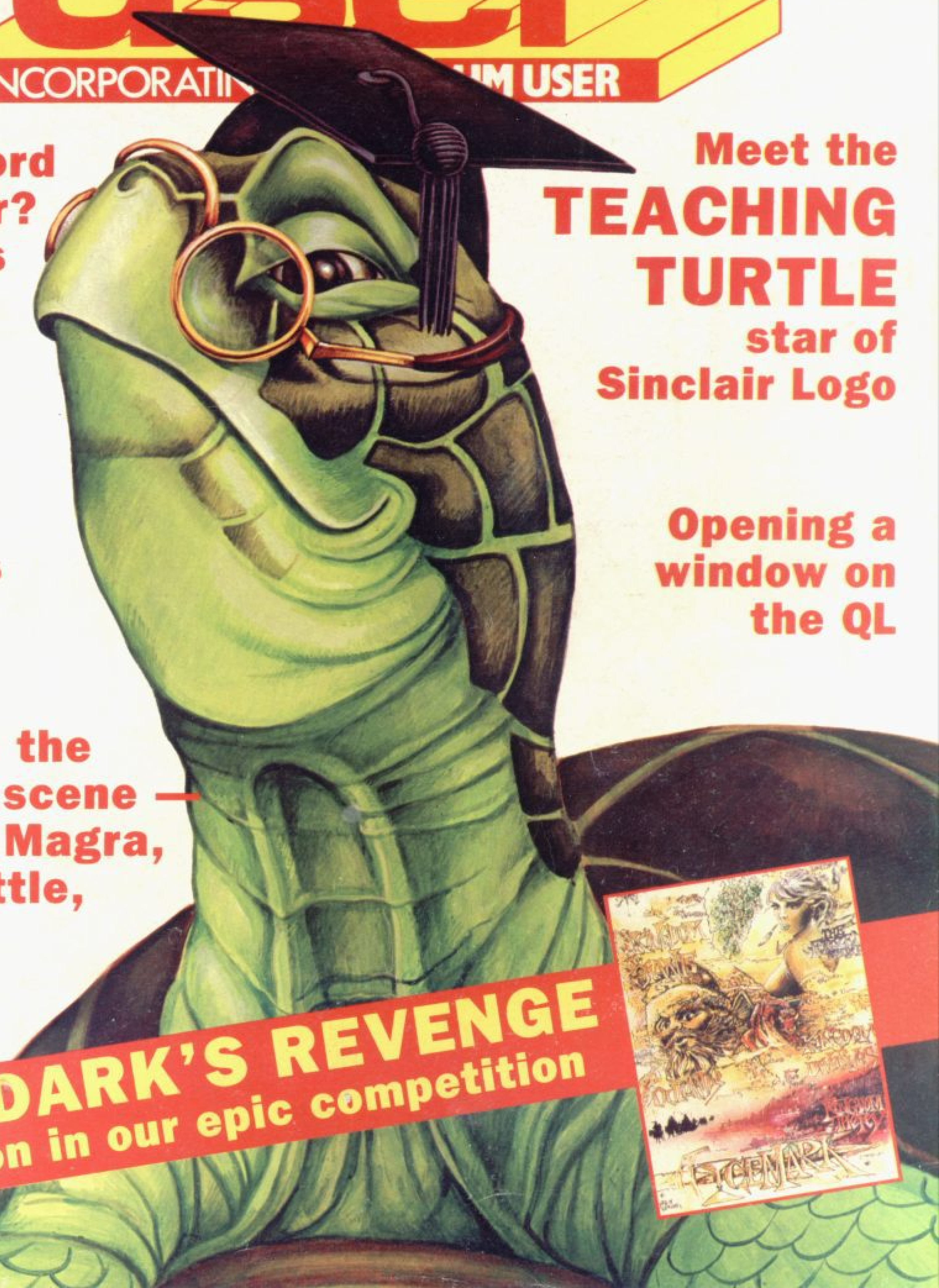
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sinclair user

Issue No 31

Only 85p

INCORPORATIN[G SPECTR]UM USER



Which word processor? Packages reviewed

Meet the TEACHING TURTLE star of Sinclair Logo

Over 18 pages of programs

Opening a window on the QL

Latest on the software scene — Wrath of Magra, Full Throttle, Sherlock

DOOMDARK'S REVENGE to be won in our epic competition

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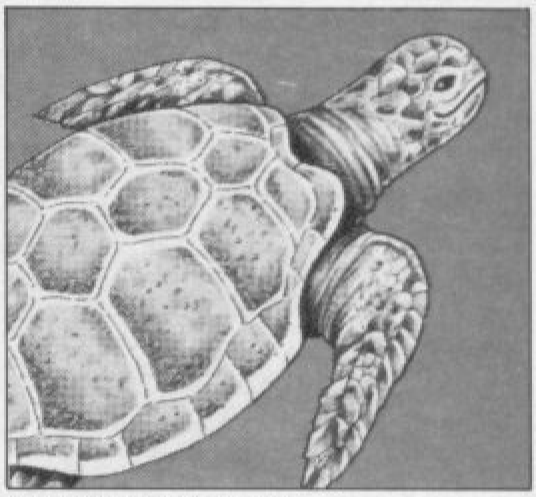
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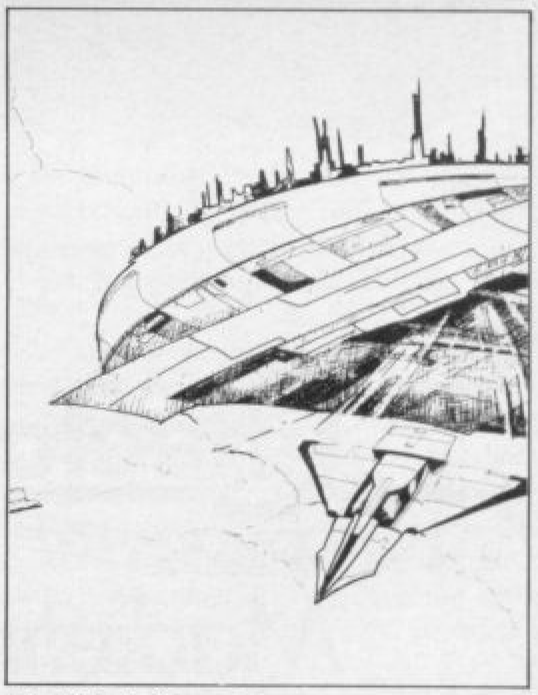


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The Right Stuff, page 79

LIVING IN THE SINCLAIR WORLD

THE ANNOUNCEMENT by Sinclair Research of an all-out £4 million advertising attack on the media in the autumn, together with giveaway Spectrum and microdrive software packages, is likely to breathe more life into the comatose home micro market than any other development this year. It is a much needed shot in the arm which, for some companies, has come almost too late.

The campaign, larger than any staged previously by the company, will include coverage on TV for the first time, as well as the national and computer press, and the Sunday colour supplements.

For openers Sinclair is promoting the Spectrum Six Pack, a package of six classic software programs given away with each 48K Spectrum sold from mid-August until stocks run out. Sinclair plans to give out £14 million of software in that way and expects the offer to secure once and for all its already enviable share of the home computer market. "We think the Six Pack promotion will knock the competition for six", said retail business manager Anton Boyes ingenuously.

Advertising will also support the QL and the flat-screen TV — remember that? — both of which should be on sale in the shops by the time you read this. Lest that sounds too good to be true managing director Nigel Searle has added the predictable rider: "We anticipate that demand will inevitably outstrip supply." No, really? To meet that demand QL production will rise to 50,000 units a month and that of the TV to 20,000, so perhaps delays — that quintessential Sinclair hallmark — will be shortlived.



Possibly more interesting is the extra boost the company will give to sales of the infamous ZX microdrives. Similar to the Six Pack offer, the Expansion System is a package of hardware and software, including an Interface 1, a microdrive and, at no extra cost, four programmed cartridges — Tasword 2, Masterfile, 3D Ant Attack and Games Designer. On the fact of it, a pretty good deal, though it has come a year too late.

Notoriously difficult things to use at the best of times, the microdrives have not fulfilled users' expectations, and even now, more than a year after they were launched, there is precious little cartridge software available. Independent manufacturers simply have not followed Sinclair's lead, possibly because of the much whispered-about cartridge supply problems — hinted at by Peter Norman of Psion in his August letter to *Sinclair User*.

On top of that, attempts by owners to transfer commercial software to cartridge have been frustrated by anxious software houses wielding copyright laws and getting excited — often justifiably — about small outfits advertising tape-to-microdrive copy programs. Consequently, the microdrives can be used only to store your own programs. The Expansion System appears to be an attempt by Sinclair Research to get the ball rolling again.

Noticeably absent from the list of offers and promotions is anything relating to the Interface 2. Whatever did happen to the Interface 2?

Besides knocking out the competition and revitalising some less-successful products, the massive advertising campaign is a sign that Sinclair Research has decided to lose its low-profile mail order image and consolidate its position as a household name. It could also be seen as a last ditch attempt to improve profits in the current financial year after the disappointing results from the year ending March 1984. Profits for that year are not likely to exceed the £14 million made in the previous year, and could even be down on that figure. It is doubtful whether the proposed stock market flotation in 1985 will now take place.

Putting the reasons for the Big Push aside, what results is it likely to have?

The most immediate will be an extra half million Sinclair users, and that should be enough to keep the most desperate of software houses happy — though it means an extra half million potential pirates too. Possibly it might ensure that microdrives become an acceptable form of mass-storage rather than something you impress your friends with.

But the long term effects are more far-reaching. Strange as it may seem, there are at present some people who still think a Spectrum has pretty colours and a pot of gold at the end. No, not Imagine — real people who actually use TVs for watching *Dallas* and not playing **Alien Genocide.** This advertising campaign could change all that. Sinclair could even become the generic word for computers, as in "of course my tax returns aren't correct, I've sinclaired them."

By December it will be possible to get up in the morning, open the paper and have a dead-flesh keyboard grinning up at you. Switch on your dinky little pocket TV and there — sandwiched between Roland Rat and Henry Kelly — another 48K wonder. Even the cornflakes aren't sacred. Sinclair has launched a major back-of-pack promotion with Kelloggs to be carried on 30 million packs and reach eight million UK households. Not forgetting the promotion already being carried on Macleans toothpaste tubes. Is this the kind of world you want your children to grow up in?

The best to you each morning.

Bill Scolding



HIGH RESOLUTION THAT COMES HIGHLY RECOMMENDED.

"There is no doubt that the JVC range of ECM colour monitors is excellent value for money . . . there is no loss in quality of picture after long periods . . . and remember, as more and more resolution is available with new micros, the need for a better display will be that much greater."

High recommendation indeed from Personal Computer News. Meanwhile Acorn User said:

"It seems that all 'normal' and 'medium' resolution monitors, including the Sanyo, are simply inadequate to deal with the Beeb's graphics and text output . . . The JVC was excellent, giving clear, legible results . . . Was the JVC better than the Microvitec?* Would I buy one? Yes to both questions."

Our RGB high resolution colour monitor (580 × 470 pixels) sells for £229.95 (excluding VAT) – that's a saving of over £100 compared with other leading monitors of similar specifications.

The unit has a 14" screen and is suitable for the BBC Micro, Electron, Sinclair QL, Lynx, Oric, Apple, IBM and most other leading micros.

MODEL REFERENCE	1302-2 High Resolution
RESOLUTION	580×470 Pixels
C.R.T.	14"
SUPPLY	220/240v, 50/60Hz.
E.H.T.	Minimum 19.5kv Maximum 22.5kv
VIDEO BAND WIDTH	10MHz
DISPLAY	80 characters by 25 lines
SLOT PITCH	0.41mm
INPUT: VIDEO	R.G.B. Analogue TTL Input
SYNC	Separate Sync on R.G.B. Positive or Negative
EXTERNAL CONTROLS	On/off switch and brightness control

And naturally there's a year's full guarantee.

If you order your monitor by post, you'll receive it within ten days by courier service.

Simply post the coupon below to: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Or telephone 01-701 8668 quoting your credit card number. Or, of course, you can buy at our showroom between 9.00–5.30pm, Monday–Friday, 9.00–1.00pm, Saturday.

*Microvitec Cub 14" monitor.

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Please send me:

_____ High Resolution Colour Monitor(s) at £229.95 each (ex. VAT).

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I understand carriage per monitor will cost an extra £7.00. (N.B. A High Resolution Monitor including VAT, lead, and carriage costs £279.39. A Medium Resolution Monitor including VAT, lead and carriage costs £221.89).

I enclose a cheque for £_____ Or please debit my credit card account with the amount of £_____ My Access/Barclaycard (please tick) no. is_____

Please state the make of your computer_____

Name_____

Address_____

_____

_____

Telephone_____

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SU6

Now play the sequel

A VEIL of secrecy surrounds the Software Projects sequel to **Jet Set Willy.**

Apparently the game is to be called **Willy Meets the Taxman** and involves our hero trying to avoid paying tax on his gains from Jet Set Willy.

Another sequel soon to be officially launched is **Travel With Trashman,** the New Generation international follow-up to **Trashman** in which the wandering waste collector samples the delights of foreign rubbish.

In Samoa he relaxes on the beach only to be bombarded by coconuts. In Russia he runs the gauntlet of the KGB when he picks up top secret litter in Red Square.

Also due for release soon is **Doomdark's Revenge,** the sequel to **The Lords of Midnight** from Beyond Software. The new game also forms part of a competition in this issue of *Sinclair User* in which you can win a specially commissioned map of the Land of Icemark.

Trials of Imagine

IMAGINE SOFTWARE may be dead but its bones have yet to be laid to rest.

The company left the marketplace with debts estimated at £1 million and with 80 creditors. The meeting of creditors and former employees was a heated affair with directors Mark Butler, Dave Lawson and Ian Heatherington hiding from the wrath of former customers in a room next to where the vote for closure was taking place.

The official receiver, Bill Wheatley, has managed to recover £300,000 in assets from the sale of company vehicles and furniture. At one point Imagine directors tried to set up a company called Finchspeed which bought the rights to the megagames developed by Imagine and said to be worth £4 million. Those were sold for £700 on the understanding that Finchspeed paid some profits back to Imagine in order to clear its debts.

Accusations and counter-accusations have continued to fly. At one point it was reported that Steve Blower, a former director of Imagine, had requested warrants for the arrest of Butler and Lawson. Blower claimed that a previous court order which instructed them to remove his name from a £100,000 bank guarantee was not honoured.

The Merseyside Commercial Squad knows of no such request. A police spokesman says: "The Commercial Squad does not have warrants of arrest out for any of the directors. It is, however, looking at the case in a wider sense".



AGEING HEAVIES of punk The Stranglers are to include an adventure game on their next album *Aural Sculpture*. The game has been written on the Gilsoft Quill system and involves travelling around the world collecting parts of an ear.

Playing the China card

CHINA is about to receive its first Spectrum experience.

A total of 600 units are bound for the computing and automation department of China's North East Technical College. They will be used by graduate researchers as an effective low-cost means of learning Basic programming skills. Sinclair Research is supplying an introductory library of Spectrum software including MicroPROLOG and Logo languages.

Charles Cotton, head of Sinclair's export department says: "China is a very important potential market for us, and one in which we are investing considerable time and effort."

more news on page 8

More Christmas software

GAMES WORKSHOP, the company which introduced the *Dungeons and Dragons* role-playing game into Britain, has launched its first two software releases.

Battle Cars, for the 48K Spectrum, is a two-player game produced from an original board game. It involves racing around a city doing battle with other drivers.

The other game, also for the Spectrum, is **D-Day.** It is based on the Normandy landings in 1944 and again involves two players.

Melbourne House has finally released its latest adventure **Sherlock.** It has the same format as **The Hobbit,** including a graphic display of the locations together with a powerful input editor which reads almost normal English commands into the game and acts upon them.

The company is not so willing to talk about its dealings with the *Lord of the Rings* copyright holders Allen and Unwin. It is reported that Melbourne House wants to produce a series of games based on the books. The company has an option on the rights but eager customers are unlikely to see the games before the end of 1985.

Legend, the creator of the popular adventure **Valhalla,** will be launching a new game soon called **The Great Space Race.** It is a science fiction adventure and includes 3D space scenes which are produced almost instantaneously on the screen using a system which Legend calls Movisoft 2.

Hewson Consultants has a release which it feels is destined for winter stardom. **Avalon** features 3D action as a sorcerer battles his way out of an evil wizard's castle. The game's graphics are a major selling point according to Andrew Hewson, managing director of the company and columnist for *Sinclair User:*

Top Ten

Program	Last Month	Company	Memory
1 Jet Set Willy	1	Soft Proj.	48K
2 Jack and the Beanstalk	—	Thor	48K
3 Tornado Low Level	—	Vortex	48K
4 Blue Thunder	2	Foundry	48K
5 Match Point	—	Psion	48K
6 Zaxxon	8	Starzone	48K
7 Full Throttle	—	Micromega	48K
8 Psytron	6	Beyond	48K
9 Lords of Midnight	—	Beyond	48K
10 Chequered Flag	7	Psion	48K

Figures supplied by W H Smith.

QL courses for confused businessmen

OWL CONSULTANTS is setting up a regular series of courses to introduce businessmen to the QL, following an experimental course in July.

The introductory course has attracted interest from many business people, according to Principal Elayne Coakes. It will be joined in October by an advanced course showing how to set up simple models and a database using the Abacus and Archive software provided with the machine.

Courses will run every five weeks and last a full day each, costing £70 for a day or £130 for both courses together. 'There will be a maximum of six people on a course' says Coakes, 'So everybody gets hands-on experience. The aim is to introduce people to the machine and give them the confidence to use them in their own businesses.'

At present Owl has two early QLs, but is expecting a third dongle-free machine to arrive soon.

Languages for QL

THE FIRST BATCH of QL software from Sinclair Research is planned for release in the last quarter of this year. It is reported that the products will include a full 68008 assembler and versions of the languages Pascal, C, and MicroPROLOG.

Some companies have beaten Sinclair to the software starting post with products such as machine code aids, business programs and languages.

Metacomco has produced a full assembler for the QL. David Sykes, a spokesman for the company says: "The assembler has a high specification including a powerful editor and allows access to the full multi-tasking capabilities of the QL".

Asked about the Metacomco link with Sinclair Research Sykes would not give too much away. "We are a software company which has an established series of languages for 68008 based computers. I leave you to draw your own conclusions".

It has been reported that the company is preparing a version of Pascal for the QL and that Sinclair Research has shown interest. It may be one of the products launched by Sinclair later this year.

One company which has branched out independently into QL software is Computer One which is based in Cambridge. Its new range includes a typing tutor, an assembler, QL Forth and QL Pascal. Forth is configured to the FIG standard and the structured Pascal language has extensions to take into account special QL features.

Hardware for the QL is still only trickling onto the market and consists mainly of monitors from companies such as Microvitec and Centronics printer interfaces from companies such as Cambridge Systems Technology and QL Systems.

There is still no news, however, of the add-ons from Sinclair. A spokesman for the company says: "The RAM upgrade is high on the list of priorities for the QL but we have not set a definite date for its release".

Software company Psion, which is well known for its close links with Sinclair Research, is said to be developing a chess program for the QL.

Psion itself refused to comment on the report, but a reliable source said the program contains a real-time chess clock as well as options for recommended moves and withdrawal of moves.

The Odyssey is over?

STEPHEN Briers, who runs Odyssey Computing, has been arrested by the police following a complaint made against the company.

Local police say Briers was arrested and later released on bail. No charges had been brought at the time of going to press, but a police spokesman said inquiries are being made by the Fraud Squad.

There have been doubts about the company for some months. Whatever the outcome of the investigations, it seems likely that Odyssey will join the list of software houses for whom 1984 was the end of the road.

Instant software in store

AN ELECTRONIC software distribution system is to be introduced to British retailers later this year.

The system, from Program Express Limited, will allow retailers to manufacture their stocks of software using a remote terminal which is controlled by a central database containing a full range of business, educational and games programs.

When a customer wants a piece of software the retailer inserts the relevant storage medium — tape, disk or cartridge — into the terminal and asks the computer for the selected software. That piece of software is then downloaded onto the storage medium which is sold to the customer.

The database is capable of holding 1000 programs on a 40-megabyte disk which are updated by telephone link to a central computer. It does away with the need for retailers to stock great quantities of programs.

One of the first retailers to introduce the system will be John Menzies. Robert Black, managing director, says: "We are very excited by this revolutionary system having shown strong interest in it from the start. It will keep us at the forefront of computer software retailing".



Another company also interested is Boots. Peter Frost, Assistant Merchandise Controller says: "Boots see the system as being of benefit in the retailing of computer software. We are currently very interested in the system".

The central computer, based in Edinburgh, will also ensure that the security of the system is at its maximum. Copying of programs and physical theft are made virtually impossible.

New offer on microdrives from Sinclair

A NEW package called the **Expansion System** has been launched by Sinclair Research.

The package is for the 48K Spectrum and comprises an Interface One, microdrive and four cartridges with an assortment of software. In the business field **Tasword II** from Tasman and **Masterfile** from Campbell Systems are included. Games players are catered for with the Quicksilva **3D Ant Attack** and **Games Designer.** The package costs £99.95.

Credit cards for secure software

SOFTWARE companies have started to go to unusual lengths to combat the threat of software piracy.

The latest device has been invented by Rising Edge Data Ltd, a company which is associated with software house Abacus Programs. It operates on the bank cash point principle. A device has to be attached to the computer and an identity card is inserted into it. If the information on the card matches that within the device it allows the program to run.

If the card is not the one designed for use with the system then the program cannot be used. A spokesperson for RED Ltd says: "The device will stop pirates who may be able to duplicate the programs but not the cards which are made by Datacard, the company which deals with Access and Barclaycard. The system protects itself."

The initial hurdle to be overcome will be convincing software houses that the system is worthwhile. Only if sufficient companies are involved will customers be persuaded to buy the device. The costs of the cards supplied with each software item are likely to be absorbed in the overall price.

A simpler, but less secure, solution to the problem of piracy is being used by a new software house called Elite Systems. The company has started to put holographic markers on the cassette inlay cards. Those are difficult to produce without a knowledge of holographic techniques. All Elite titles will bear the hologram. If any are found without it they will be pirated copies.

Sinclair in wafer chip race

SIR CLIVE Sinclair has announced an investment program of "millions of pounds" into the development of fifth generation computers capable of using artificial intelligence techniques to process and transmit information.

The project is based at the Sinclair MetaLab, which employs a group of high-powered programmers and electronics engineers committed to research and development of advanced application of new technology.

In entering the field, Sinclair is competing not only with multi-national organisations such as IBM, but also with government projects in the EEC and Japan. Sir Clive claims that what counts is the calibre of the people involved, and not the number of dollars spent.

Underpinning the project is the development by Sinclair of the Wafer Chip, a new Processor capable of very high speeds and with powerful multi-tasking abilities.

Sir Clive plans to release the first product using wafer chips in the form of a half-megabyte RAMpack for the QL. The company has not however fixed any firm dates for the new add-on, although a spokesman says the product has the highest priority.

Meanwhile, Sinclair Research is expected to reveal profits considerably lower than those forecast for the last year. Profits rose from £8.5m to £14m in 1982-83, but seem likely to remain at £14m or even fall for the 1983-1984 tax year, reflecting the company's problems with distribution and production.

The disappointing news may jeopardise the promised flotation of Sinclair Research next year as a public company. Managing director Nigel Searle insists that investors do not realise the full range of the company's activities because they will only see the figures to the end of March, which do not include QL sales.

"It is very difficult to convince people that we're doing the right things and they shouldn't worry about last year" he says.

Future plans for expansion include re-entering the American market under the name Sinclair and stepping up the production of Spectrums to 200,000 machines a month. The QL and flat-screen TV are also said to be ready for full production, and hopes for a renewal of public confidence in Sinclair Research clearly depend in large part on the success of those products.

Anti-piracy legislation

A BILL on computer software copyright has been introduced to the House of Commons under the ten minute rule by Nicholas Lyell, MP for Mid-Bedfordshire.

The Bill seeks to amend the 1956 Copyright Act to provide greater search powers and new penalties for pirates who infringe copyright of computer software. It is unlikely to become law as the ten minute ruling is for MPs who want to raise an issue with the house through their own Bills but cannot get government support or have it included in the normal business of the House.

Donald MacLean, Chairman of the Federation Against Software Theft which supports the Bill says it "highlights precisely the changes in legislation required to counter the growing problem of software piracy."

Although Lyell's Bill is unlikely to succeed in leading directly to legislation Donald MacLean does not believe that the battle against the pirates is being lost. "We are encouraged to know that the government and many individual MPs appreciate the need for legislation now."

more news on page 10



MICRO-MAGICIAN David Hambly shows ITV presenters Tessa Shaw and Valentine Nonyelu a trick or two with a Spectrum. David was making a guest appearance on *Video and Chips,* the network teatime show for young computer enthusiasts.

Program correction

IN THE September issue of *Sinclair User* we inadvertently omitted the first listing from the program **Boxing** on page 67. Here is the missing program, which sets up the User-defined graphics. Save it before you RUN it with SAVE "name" LINE 100 and it will set up the graphics and load the second listing.

```
 100 BORDER 0: PAPER 0: INK 6: B
RIGHT 1: FLASH 1
 200 CLS
 500 PRINT AT 10,0; FLASH 1;"STO
P THE TAPE RECORDER NOW!!!!!!"
1000 GO SUB 3000
1500 FLASH 0: PAPER 6: BRIGHT 1:
 INK 0: CLS
1900 PRINT AT 10,0;"START TAPE A
GAIN.LOAD 2ND PROG"
2000 LOAD ""
2500 STOP
3000 FOR j=144 TO 164: BEEP .4,-
140+(j*1.2): FOR k=0 TO 7: BEEP
.002,40+(k*2): READ n: POKE USR
CHR$ j+k,n: NEXT k: NEXT j
3100 RETURN
3200 DATA 60,126,106,97,98,102,3
6,36
3300 DATA 40,68,163,191,131,255,
132,132
3400 DATA 132,252,252,164,164,16
4,252,72
3500 DATA 72,72,112,112,80,80,12
4,126
3600 DATA 0,0,0,112,143,1,31,224
3700 DATA 0,0,0,56,248,120,248,1
92
3800 DATA 60,126,86,134,70,102,3
6,36
3900 DATA 20,34,197,253,193,255,
33,33
4000 DATA 33,63,63,37,37,37,63,1
8
4100 DATA 18,18,14,14,10,10,62,1
26
4200 DATA 0,0,0,14,241,64,248,7
4300 DATA 0,0,0,28,31,30,15,3
4400 DATA 24,36,24,60,126,255,12
6,24
4500 DATA 16,108,199,224,96,255,
124,0
4600 DATA 31,32,248,71,128,255,3
2,31
4700 DATA 0,240,127,121,241,17,2
41,255
4800 DATA 8,54,227,7,3,255,62,0
4900 DATA 248,2,31,116,1,255,2,2
48
5000 DATA 0,15,247,151,31,17,31,
255
5100 DATA 0,16,48,127,255,127,48
,16
5200 DATA 0,8,12,254,255,254,12,
8
```

New production target

PLANS to increase manufacturing capacity for all major products have been announced by Sinclair Research.

The company wants to double Spectrum production to more than 200,000 units per month by the end of this year and to start to produce QLs at a rate of 50,000 units per month and pocket televisions at 20,000 units.

As production increases Sinclair will mount a £4 million UK advertising campaign including television coverage. It will include the new Spectrum Six Pack software offer. All buyers of 48K Spectrums will receive six titles, normally priced at £56.70, for free, including **Chequered Flag, Scrabble, Make a Chip** and **Horace Goes Skiing.**

Nigel Searle managing director of Sinclair Research is confident that the new advertising strategy will work but is cautious as retail sales of the QL and flatscreen television planned for this month will be necessarily low as supplies are limited. "While production volumes for both are building up fast, we anticipate that demand will inevitably outstrip supply. We will be working carefully to ensure the fairest possible distribution".

Computer masquerade

A £30,000 golden hare is being offered as a prize in a game from a new company called Haresoft.

The game, called **Hareraiser,** is in two parts and takes its plot from **Masquerade,** a best selling book by Kit Williamson. The author crafted a golden hare which was won by solving the pictorial clues within the book.

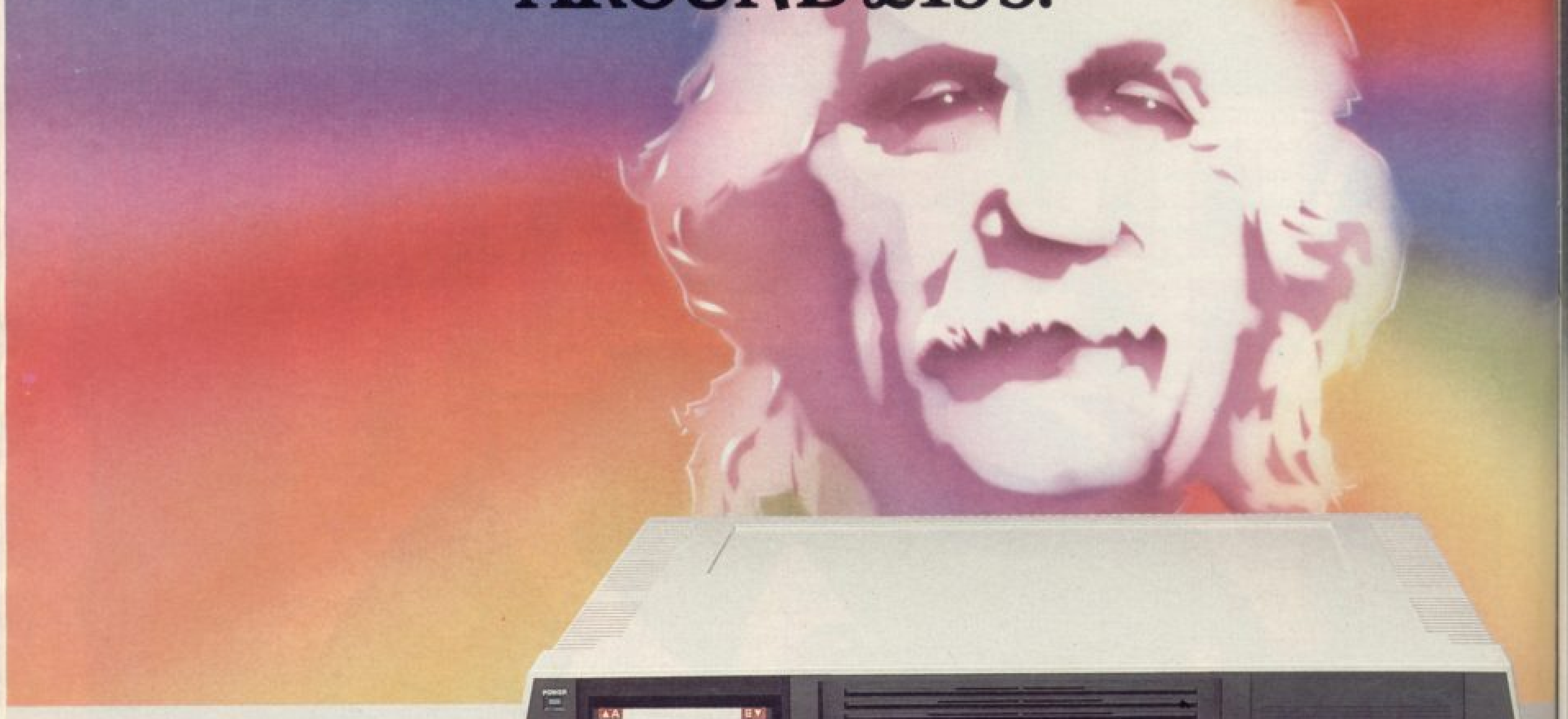
The same strategy is being employed for the game puzzle with one difference. In the original competition the winner had to dig up the hare. Haresoft, however, does not want to encourage purchasers of the game digging up fields and ancient monuments.





THE 3D ADVENTURE MOVIE
AVALON
AVALON
For the first time ever there is an all action, 3D adventure game with stunning moving graphics – the unique Avalon.
Only Hewson Consultants could bring you Avalon with its awe inspiring animation. Avalon is the breakthrough that brings adventure to life. In this challenging game you must use your astral projection Morac the Mage to search into the heart of the Isle of Glass and forever banish the Lord of Chaos before he can subject Earth to the Dark Ages for a thousand years. You must explore a three dimensional world with more than 220 separate rooms and over 30 tunnels. On your way you will be challenged by over a hundred animated foes, goblins, wraiths, guardians and evil wizards. Your only protection is the magic of your spells. Avalon, by Steve Turner, is the adventure game of the year, and is available NOW! from your local software stockist. Remember, a world of graphic adventure awaits for only £7.95
Other titles for ZX Spectrum
3D LUNATTACK – Steve Turner
Fly your Hover Fighter over the 3D Lunar landscape battling the SEIDDAB.
Joystick compatible, 48K only £7.95
3D SEIDDAB ATTACK – Steve Turner
Using your radar, missiles and sixth sense clear the city area of SEIDDAB.
Joystick compatible, 16K or 48K £5.95
3D SPACE WARS – Steve Turner
Hunt the Seiddab through four levels of 3D hyperspace and destroy them.
Joystick compatible, 16K or 48K £5.95
NIGHTFLITE II – Mike Male
Flight simulation with full instrument display and perspective runway view.
Joystick compatible, 16K or 48K £7.95
HEATHROW AIR TRAFFIC CONTROL – Mike Male
Written by a professional air traffic controller.
16K or 48K £7.95
QUEST ADVENTURE – Kim Topley
Find a map hidden in an inhospitable world inhabited by gruesome creatures.
48K only £5.95
FANTASIA DIAMOND – Kim Topley
Retrieve the magnificent Fantasia Diamond and rescue Boris the master spy.
48K only £7.95
KNIGHT DRIVER – Clive Brooker
Steer your car round a tortuous circuit of roads, braking and accelerating as you go.
Joystick compatible, 48K only £5.95
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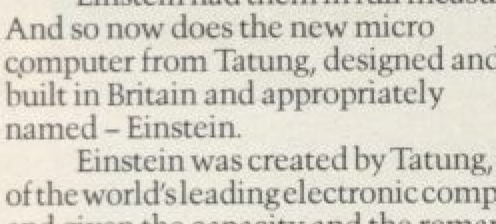
Einstein had them in full measure. And so now does the new micro computer from Tatung, designed and built in Britain and appropriately named – Einstein.

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Einstein, designed and built in Britain, is a complete colour micro computer with no hidden extras.

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†CP/M is a trade mark of Digital Research Inc

The Space Saver Station



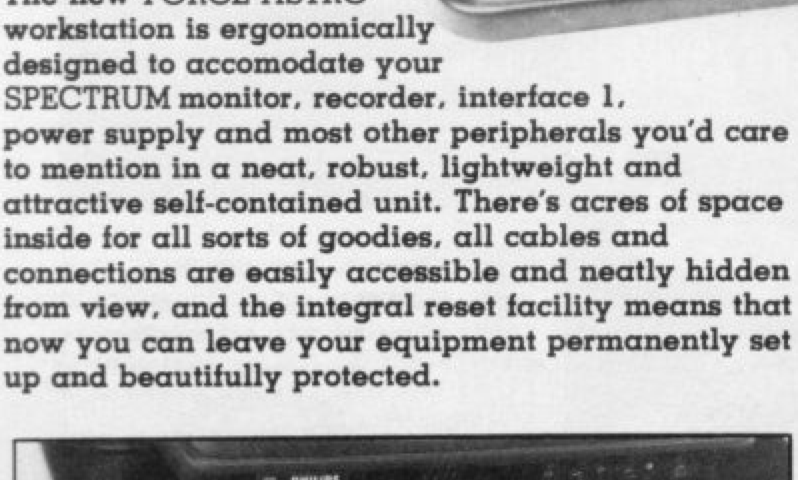
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Decline and fall of micro empires?

ON YOUR FIRST news page of issue 29 four news items were covered. No less than three of those were about companies in financial difficulties or going into liquidation. Imagine, Carnell and Lynx are all well-known names to computer enthusiasts, but even they have trouble keeping alive.

Is this the start of the decline of home computers? Will the computer industry disappear as fast as it sprung up? High-priced tapes and pirating have a lot to do with it but so have advertisements in computer magazines, and no-one says anything about that. Those big, double-paged, glossy and colourful adverts must run into thousands of pounds.

I fear that home computing is on the decline and too much commercialisation and greed is corrupting the industry.

Dietmar Osman,
Farnham, Surrey.

Economical computing

I THOUGHT you might be interested in hearing of two ways in which you can save money when using the Sinclair Interface 1 with a printer. Do not spend £14.95 buying a special lead from Sinclair, buy a 10 ft joystick extension cable from Tandy, cut off the end that does not fit in the RS232 socket and solder a D-Submini 25 Female connector to the open end. The cable was £2.99 and the plug £4.69; I thus saved £7.27. It is easy enough to find out which of the nine wires to solder using a battery & bulb to complete a circuit.

I also have a Brother EP44 which you reviewed in July. Despite what you say, if you have listings without graphics it is a great machine. I found the smooth paper rather expensive though — £2.00 per 100 sheets at Rymans — but Discount Stationary Supplies in Crawley sell Liquid Toner Copier Paper — Super Smooth Bond — for only £2.35 per 500 sheets.

Richard Butler,
London SW16.

The mad Sir Clive?

I READ WITH INTEREST Sir Clive's speech to the US. Congressional Clearing house on the Future printed in your August issue. Although I agree that some of the ideas he predicts for the future are possible I am wondering if he is turning into a mad scientist in predicting that man could create a life form better than himself.

Before predicting such nightmares Sir Clive should consider that nothing science will ever create will surpass man, as neither science nor man will never understand the full power of the human mind. Man's brain and body may eventually be created but man's consciousness is not of physical nature and definitely cannot be created by human science or copied by computer software no matter how complex.

Michael Bredbury
Rhyl,
Clwyd.

User of the century

IN REPLY to the gentleman who asks whether he is the oldest Spectrum user at the age of 72, I can tell you that he is not. We have one customer who bought a Spectrum when he was 86 years old and he uses it for household accounts.

G S Tickner,
Computer Connection,
Chichester.

Foolproof converting

I WAS RECENTLY re-reading copies of *Sinclair User* and saw a program for the 16K ZX-81 called **Machine Code Converter,** in the 1983 April issue.

Could you please tell me whether it is possible or not to convert this program to the Spectrum. If it is not possible could you please list names of software on the market which do convert Spectrum Basic into machine code.

Broderic Lemon,
Pietermaritzburg,
South Africa.

• *Readers who entered the program referred to were amused — and in some cases annoyed — to find the screen displayed a message reminding them of an ancient British custom associated with the first day of April. Nevertheless it is possible to convert Basic into machine code using a compiler, One of the best is* **FP Compiler** *from Softek, 329 Croxted Road, London SE24.*

Virgin Golf error

AS THE WRITER of the Virgin **Golf** game mentioned in your "Software for the Spectrum Sportsman" article in the August issue, I was dismayed to see that you continue to refer to it as a 16K Spectrum game.

Anyone buying the cassette gets the 16K version on one side, and the 48K version — which is very much enhanced — on the other, so it will cater for owners of either machine.

David Thomson,
Westhill, Aberdeen.

The unmusical box

HAVING ENDURED the lifeless beep obtainable from the Spectrum for what seemed like an eternity, I decided to invest in a Fuller Box. Yes, I did mention Fuller, the company whose delivery dates make Sinclair seem reasonable and who are more difficult to contact than Lord Lucan.

I placed my order in November 1983 and received my Fuller Box in February, four months later.

The unit is a good piece of hardware, when it works; the only drawback is the manual — two pieces of paper folded immaculately into triangles — which explains how to program the joystick port and how to turn on and off the various channels of the sound chip. It fails to point out the most important thing to me, that being the numbers corresponding to notes such as C,D,A,F#, thus preventing me from producing a tuneful song. I have tried producing notes from the Fuller Box and comparing them to known notes from the Spectrum speaker, but to no avail. Does anyone in the world know how to produce real notes from the Fuller Box?

Grant Pettigrew,
13, Glenside Gardens,
Armadale,
West Lothian,
Scotland.

more letters on page 16

Microdrive cartridges with built-in obsolescence

WITH DISMAY I am joining the ranks of dissatisfied owners of Sinclair Microdrives. After an hour or so of use loading programs from cartridge becomes increasingly difficult. The drive whirrs on and on, finally stopping with the message "FILE NOT FOUND". I suspect that to be caused by overheating in the Spectrum and hopefully it will be remedied by fitting the PCB into a larger housing.

My irritation grew when one day the cartridge supplied with the drive suddenly failed to load. The same message repeatedly appeared on the screen: "Microdrive not connected". Other cartridges functioned normally. The only recourse was formatting the cartridge and erasing all existing files but again the same puzzling message appeared.

The cartridge is now useless. The instruction booklet for the Microdrive warns that cartridges will not last forever but that is ridiculous, it is barely two months old. Considering the price of cartridges — in Holland they cost nearly £7.00 — that is quite unacceptable.

With the recent appearance of low-cost disk drives which operate on the Interface 1 ROM, I am gnashing my teeth for not having waited a little longer for a more reliable fast access storage system.

R Readinger, Amsterdam, The Netherlands.

Computa-Fix recommended

AFTER READING the letter by A F Winslow in *Sinclair User,* June 1984, I sent my Spectrum to Computa-Fix, since it had stopped producing colours on the screen.

It was returned, by registered parcel, in just over a week. Not only were the colours restored, but their clarity and accuracy were greatly improved. Furthermore, the company had installed the PCB into its dk'tronics case somewhat more neatly than I had ever managed — see the article by John Lambert in the same issue of *Sinclair User* for an account of the difficulties in fitting it.

In short, not only did Computa-Fix repair my Spectrum, but it was returned in better condition than it had ever been in the first place. For £21.85, I think that is unbeatable.

I D Budden, Brighton, E Sussex.

Howzat overpriced

THANK YOU for the excellent review you gave to our game **Howzat** in the August 1984 edition of *Sinclair User.* We were pleased to see it reviewed alongside other Spectrum cricket games.

At the end of your article the prices of all games were printed. Howzat was said to cost £6.95 when in fact it retails at £5.50. We would be pleased to see this corrected so that your many readers may not be misled.

Roger & Pauline Smith, Wyvern Software, Bath.

Good and bad news

I HAVE some good news and some bad news about *Sinclair User.* The good news first: I find your reviews on software, hardware and books excellent and Quentin Heath's Mind Games page is very helpful.

Now for the bad news; all your articles on programming are very complicated and Hit Squad is the worst thing since roller boots. Now I have got that out of my system I ask the answer to one simple question; Is the Comcon programmable joystick interface any good?

Lee Churchill, Bristol.

● *The Concom interface is reviewed this month in Hardware World.*

Interface irritates

A FEW MONTHS ago I acquired a Kempston joystick interface and a joystick; I also recently acquired a ZX interface 1 and two Microdrives.

At the rear of the Interface 1 is an expansion port similar to the one on the rear of the Spectrum. The Kempston interface fits into this port perfectly but the joysick will no longer fit into the port on it, because the Spectrum is at an angle and it gets in the way of the port. That means every time I want to use the joystick, I must remove the Interface 1 and it also means that no programs can be loaded from microdrive that need a Kempston joystick.

Why can't the leading hardware manufacturers decide on designs that are compatible?

Michael Wood, Dublin, Ireland.

Better sweater

LAST CHRISTMAS we purchased a 48K Spectrum for our 11 year old daughter, Julie.

She is so thrilled with the computer, I decided to knit her a jumper. This has won many a compliment along the street.

Mrs H Munckton, Chard, Somerset.



User to user

Bored Craig Plumley, aged 12, of 89 Kingsway, Bourne, Lincolnshire PE10 9DJ, wants to find a Spectrum pal of similar age who lives nearby.

Italian boys would like to correspond with British Spectrum users by letter or tape. Write to Scala Fabio, Via Pegaso, 7 47037 Rimini (FO), Italy.

Kevin Hammett, aged 14, would like to share his collection of written ZX-81 programs. His address is 265 Bubbecombe Road, Torquay, S Devon.

Timex Sinclair 2068 user Edward Smith has modified his computer to accept Spectrum programs. He would like to correspond with any Spectrum or QL owner. Write to Edward Smith, c/o Portsmouth Abbey School, Portsmouth, Rhode Island 02871, USA.

Currah μ Microspeech fan Jonathan Slater of 33 Pineside Avenue, Cannock Wood, nr Rugeley, Staffs WS15 4RG wants to swop games with other Sinclair users.

Reinhard Frank needs help with machine code from British readers. His address is Brenzstrasse 3, D-7922 Herbrechtingen 1, West Germany.

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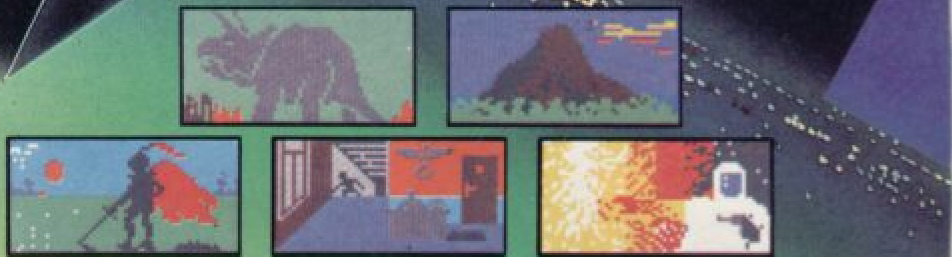
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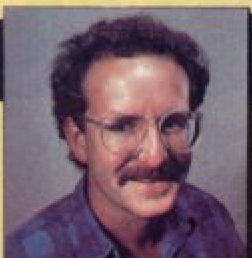
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- If you're first to ring it, you save the world and collect the £25,000!
- Quite a package! And to give everyone a fair chance, "Eureka!" will be released simultaneously worldwide on October 31st, 1984. No packs will be available until that date. All orders received by mail or phone by 26th OCTOBER will be despatched by post on the 31st right across the world. So order now, and be one of the first off the mark.



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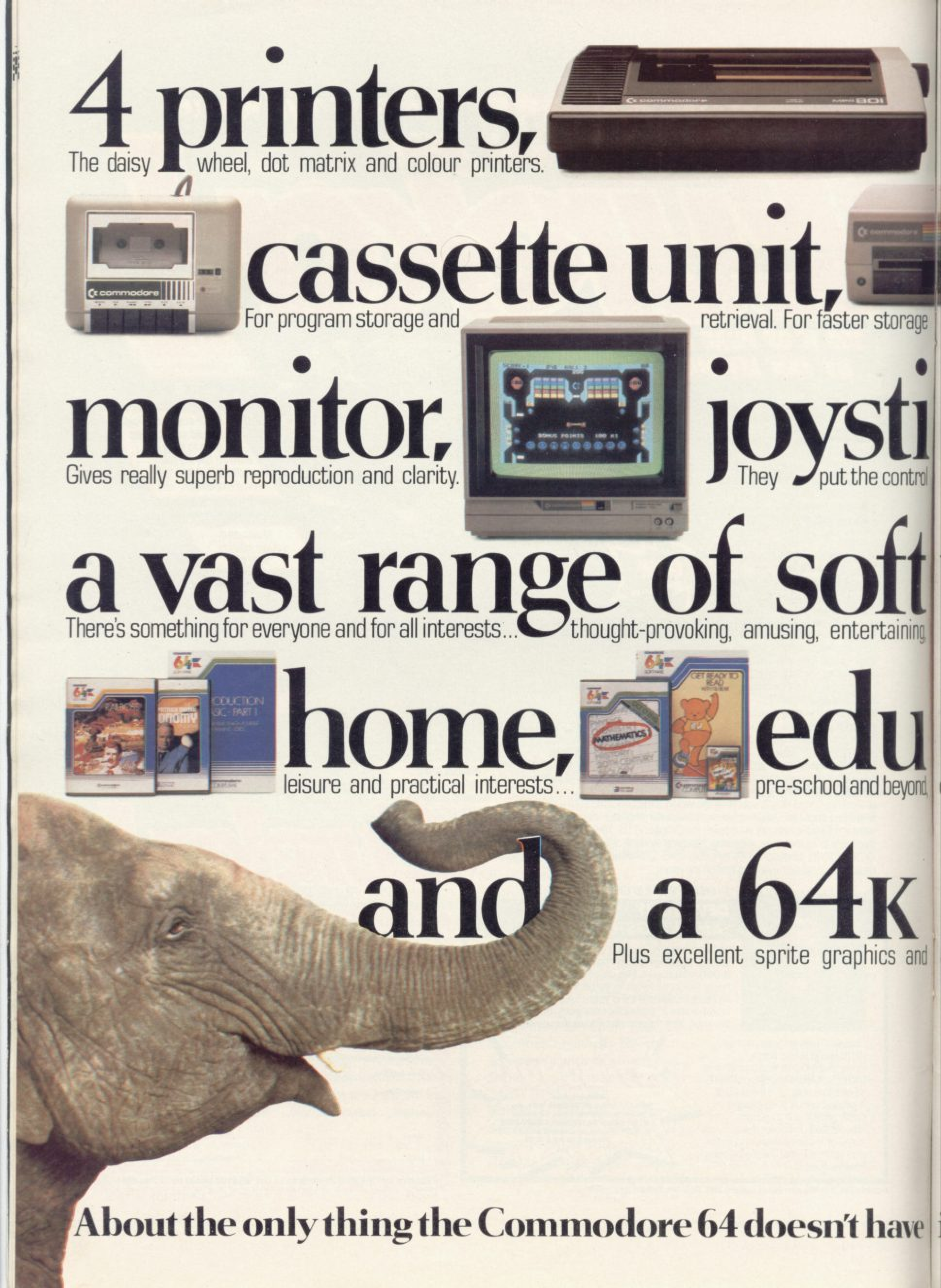
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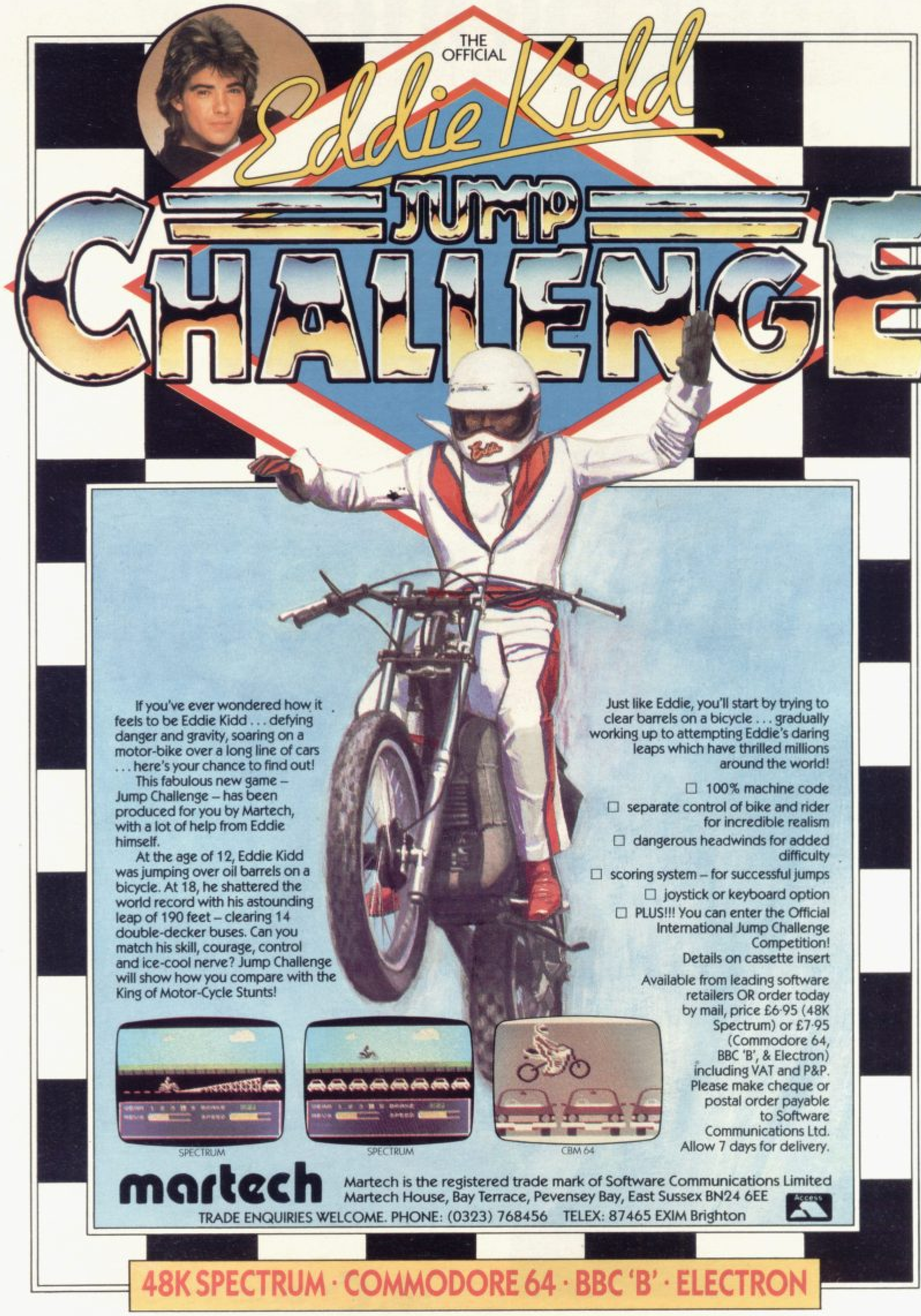
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Emperor looks good



THE EMPEROR KEYBOARD for the Spectrum from Saga Systems, previewed in the June issue of *Sinclair User*, is now available in the shops. It has undergone a few design changes since then, primarily the removal of the single key functions, but it still retains its good looks, positive key action and 67 separate keys.

In addition to the traditional 40 keys there are 21 of the most commonly used functions on separate keys plus an extra three symbol shift and one caps shift keys. Those are arranged so that the functions are adjacent to a shift key. In that way one finger can be used to press both keys, a system that works remarkably well. Those extra functions are the mathematical — addition, subtraction, multiplication, division and equals; punctuation — full stop, comma, semi-colon and colon; together with hash and dollar. All are operated by symbol shift. Delete, edit, graphics, caps lock and the four cursor keys are operated by caps shift. For good measure there are two enter keys and extra run, save and 0 keys.

To fit the keyboard the top half of the Spectrum is removed and the bottom half, containing the PCB, is bolted under the base of the keyboard. As the original Spectrum base is now the base of the new keyboard, add-ons such as Interface One connect with difficulty. Fitting only takes five minutes, as claimed in the advertising, but you then have to stick the labels onto the keys which takes considerably longer.

The price of £54.45, plus £1.15 p&p, is above average but the multitude of keys make the keyboard worth consideration. It is available direct from Saga Systems Ltd, Woodham Road, Woking, Surrey.

Instant keyboard

THE NEW SPECTRUM keyboard from Stonechip Electronics is one of the few keyboards that can be fitted without opening the Spectrum.

Fitting the keyboard is simple. The top half, which houses the keys and amplifier is connected by a ribbon cable to a long, thin PCB. That has the aerial, MIC and ear plugs on one side and sockets on the other. That is plugged into the back of the Spectrum and the keyboard then screwed together with the Spectrum inside.

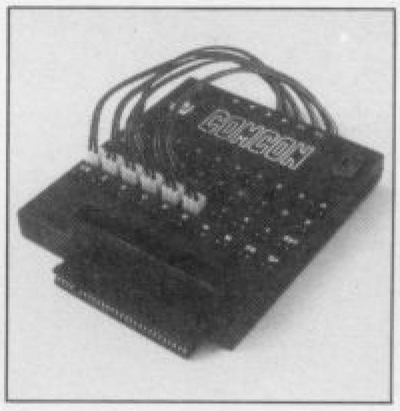
The keyboard has 44 keys including a full size space bar and single key entry delete and E mode. In addition there are two Reset keys.

At the top of the keyboard is the Load/Save switch which acts as the beep amplifier. There are both tone and volume controls and a good clear sound can be obtained. Also on top there is a LED to show you the power is on.

For reasons best known to Stonechip it has repositioned the MIC and power sockets. The MIC socket is 5mm nearer the user port and the power socket is placed betwen the two that small alteration means that a number of add-ons will not fit.

Priced at £59.95 the keyboard is one of the more expensive available but the ease of fitting and the facilities it offers make it a good buy. Stonechip Electronics is at Brook Trading Estate, Deadbrook Lane, Aldershot, Hants GU12 4XB. Tel: 0252-333361.







ConCom control

FREL LTD has announced its new ComCon programmable joystick interface for the Spectrum. Any key on the keyboard can be programmed, including both shift keys, and there is provision for two independent fire buttons.

The interface has arrays of pins which correspond to the keyboard and six leads representing the four directions and the two fire buttons. To program it you must plug the relevent lead into the pin you want. That can be done with a program running and the keyboard is not disabled. Any joystick with an Atari-style plug can be used. To allow for other add-ons there is an extender card which rises vertically from the front of the board.

The two joysticks that Frel markets are the Flightlink and the Quickshot II which has been adapted to have two independent fire buttons. The joystick usually has an Auto-Fire feature but that has been removed.

At £19.95, the interface is one of the cheapest on the market. The Flightlink joystick costs £10.50 and the Quickshot II is £13.95; a £2.00 reduction on either can be obtained if ordered at the same time as the interface. Further details from Frel Ltd, Hockeys Mill, Temeside, Ludlow, Shropshire SY8 1PD.

more on page 24

Strictly for amateurs

ANOTHER NEW add-on keyboard for the Spectrum is the K-Board from Kelwood Computer Cases. It has been designed as a direct replacement for the old 'dead flesh' original and fits onto the existing case.

Fitting the K-Board requires major surgery to the Spectrum keyboard. Once the two halves of the Spectrum have been separated the metal cover, which has the E-mode legends on it, is removed. The difficulty of that will depend on your Spectrum. After early complaints by owners of the glue holding the cover in place melting because of the heat, Sinclair used a more powerful glue from Issue 3 onwards.

Then the rubber mat and matrix are slipped out and the new PCB containing 40 moving key switches is put in its place. Onto this is placed a plastic housing and over the complete assembly goes the metal cover.

For each of the keys you are supplied with a new key cap. Each cap is hot-foil printed in two colours, gold and red, with the key legends. Unfortunately, as the original keys were smaller there is a small gap at the sides of all keys and the caps overhang and shadow the legends on the metal cover. It is doubtful whether the printing on the keys will wear well.

At £28.50 the K-Board is the cheapest replacement keyboard for the Spectrum on the market and is worth considering if you can not afford anything else.

For your money you get a keyboard that will, however, probably invalidate your guarantee and which retains the same, cramped, layout and does not include a full size space-bar. The keys used have negligible movement, and are not, as the advertisements claim, 'beautifully printed'. Neither is the replacement keyboard 'professional' in any sense of the word.

For further details of the K-Board contact Kelwood Computer Cases, Downs Row, Moorgate, Rotherham S60 2HD.





Around with the Champ

A RECENT IMPORT from the United States is the Super Champ joystick. What makes it unusual is that the cable is held in the base. For use the cable is pulled out and, when you have finished, rotating the stick rewinds the cable inside.

The stick is long and thin and has two fire buttons, one on top and one in the trigger position, both of which operate the same switch.

Unfortunately, there is an undue amount of play in the pivot and the stick is a little stiff. That makes precise control difficult unless you hold down the centre.

The Super Champ is priced at £12.95 from Dean Electronics Ltd, Glendale Park, Fernbank Road, Ascot, Berks SL5 8JB.

Easy on the eyes

BUSINESS computer users are very aware of the problems of looking at monitor screens for long periods. The resulting eyestrain has caused many firms to buy expensive filters to place over the screen.

The CEAF — Contrast Enhancement Antiglare Filter — from Romag is the first filter aimed at the home user. For £19.95, approximately half the cost of any other filter, you can protect your eyes until the last invader has been well and truly zapped.

The laminated glass filter is attached to the screen of a 14 inch monitor by four pieces of Velcro and, as well as giving a better picture, it also stops light being reflected from the screen, another cause of eyestrain. It even relieves the amount of static on the screen.

The filter is available in branches of W H Smith or direct from the manufacturers, Romag Safety Glass Ltd, Patterson Street, Blaydon-on-Tyne, Tyne-and-Wear NE21 5SG.

Independent joystick

VOLTMACE has launched its new joystick — the Delta 3S. Unlike most joysticks it features two independent fire buttons, one of which can be used by either left- or right-handed players, and rotary switches are used on the stick. Those switches give it a very light action and the stick can be comfortably held in the hand.

Together with the joystick Voltmace is marketing two interfaces. One, made by Rainbow Electronics, is hardware-programmable and the other, from Cambridge Computing, requires software. The Rainbow interface also incorporates a beep amplifier. The stick has a standard nine pin Atari-style plug and so will work on any interface.

Priced at £10.00 the joystick is good value and its solid construction should ensure it outlives most competitors. The Cambridge Computing interface costs £22.95 - £29.95 with joystick — and the Rainbow interface is £29.00 - £37.00 with joystick. All prices include VAT and p&p. They are available by mail order from Voltmace Ltd, Park Drive, Baldock, Herts SG7 6ES.





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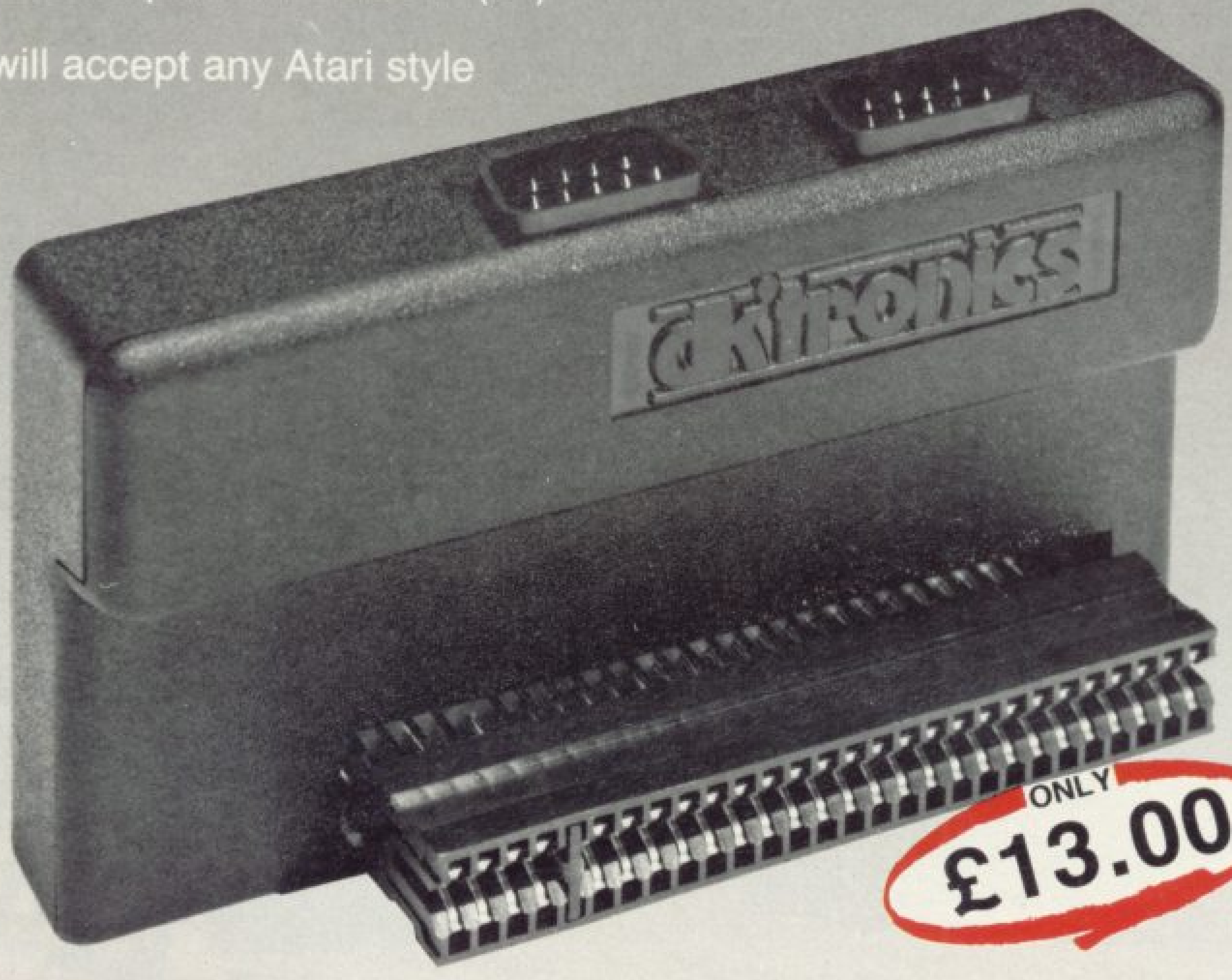
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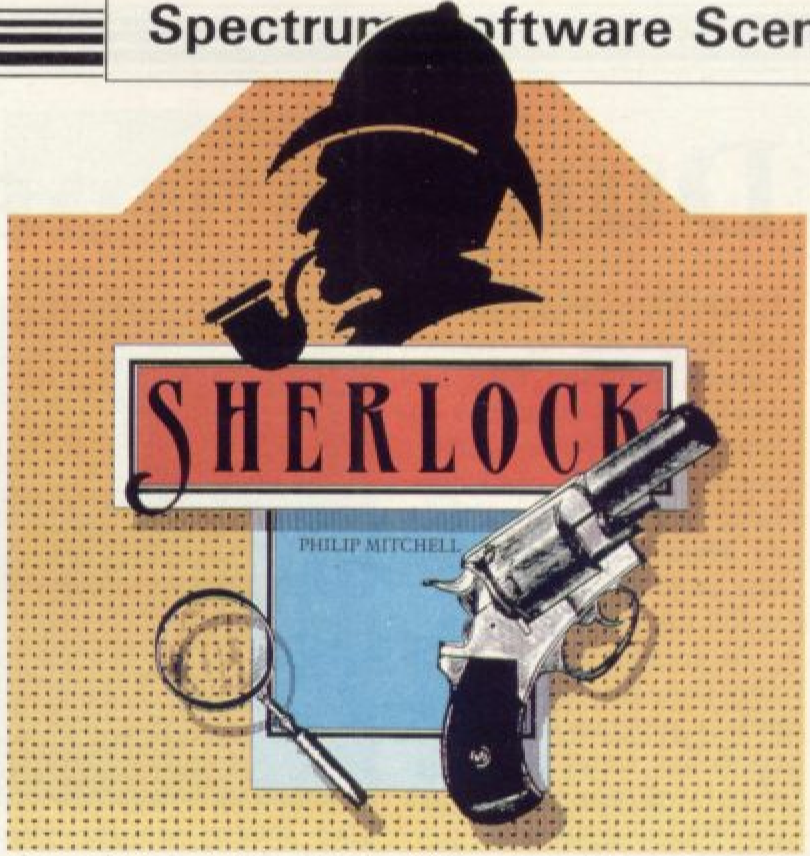
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The Spectrum Connection

Brilliant, Holmes!



THE GREAT Holmes would no doubt have been appalled by the sensationalism accorded to his powers by the new Melbourne House game, but the company has produced an adventure in **Sherlock** to rival **The Hobbit** in terms of atmosphere and sophistication. The most striking feature is the way in which the characterisation has been developed. Hobbit fans will recall how characters had a habit of wandering off in all directions or sitting on the ground and singing about gold.

In Sherlock you can not only talk to other characters, of whom there are at least thirteen, and ask them to do things for you, but you can also interrogate them and even discuss the case. For example, saying to Watson "Tell me about the gun" may or may not elicit information, whereas a sentence such as "Watson killed the Major"



will, even if addressed to nobody in particular, register with other characters in the same location who may alter their actions accordingly.

That, coupled with the Melbourne House use of English whereby the player's input is not limited to nouns and verbs but includes natural sentences such as "Quickly open the front door, go through the door and immediately hail a cab", ensures a high degree of realism. It is unnerving to have other characters, notably Inspector Lestrade of Scotland Yard, asking you questions such as "Well Holmes, have you any evidence to prove Watson killed Major Ffoulkes yet?" based on what you said earlier in the game.

The game itself opens in Holmes' study in Baker Street, with Watson seated in an armchair with the daily newspaper. It is up to you to discover what the case is about, and throughout the game, as in The Hobbit, you will need to use other characters to help you. Without wishing to give anything away, we can warn you the crime is fiendish, and the plot very complicated. We twice thought we had solved the crime after many hours playing, only to discover a new piece of evidence which blew each theory to pieces.

There are few of the logic problems whereby you need a specific object to continue to new locations, but plenty of evidence is lying about to be pieced together. As in the original stories, Holmes not only has to worry about solving the crime, but also saving the innocent, as the bumbling and self-satisfied Lestrade — beautifully portrayed — rapidly makes up his own mind as to who is guilty.

Thus the game is also a race against time, and a clock is provided on screen showing the time of day to the nearest minute. That is of the utmost importance not only as a guide to how well you are doing but also for catching trains on time. Since there is no train timetable provided, you will have to find out the schedule for yourself. Do not be surprised if your first few attempts are spent wandering around Victorian London; you will have to use the Underground system and hansom cabs very efficiently in order to be at the right place at the right time.

The graphics are not up to Hobbit standard. They occupy only a small section of the screen — about a quarter — but given that limitation are pleasing to the eye.

We also discovered the odd bug in the program. At one point a previously impeccably polite cabbie said "You bloody snob. Don't ever try to get into my cab again", whereupon the program printed out a long list of locations, and promptly crashed. On the other hand, probably deliberately, when night fell and we suggested to Watson that he go to sleep, the faithful old coot replied: "Brilliant, Holmes". He even tried to climb into Holmes' armchair when Holmes was sitting in it. Conan Doyle would have turned in his grave.

Melbourne House say in the instructions that the game cannot be guaranteed bug-free, because of the enormous number of possible events involved with character interaction. That did not seem to put people off The Hobbit, and the discovery of new Hobbitbugs became a minor growth industry in its own right. Since we can probably expect similar cries of delight from the hackers over Sherlock, perhaps Melbourne House should be given the benefit of the doubt.

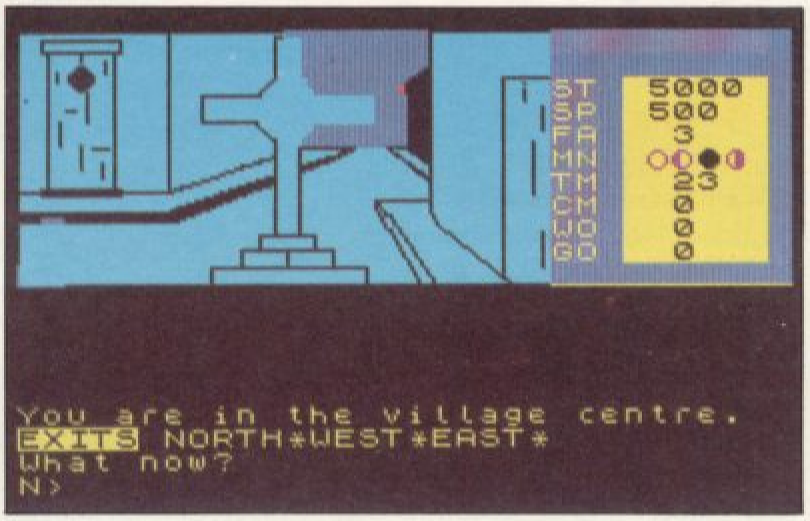
Familiarity with the Sherlock Holmes stories will help you play the game, although not as directly as a knowledge of Tolkien helps solve The Hobbit. In particular, you should remember that Holmes never unravelled a case by deduction alone, but had great powers of observation. You cannot solve the mystery without the aid of the police, but you will need to strike out on your own account to improve on their performance. The police are also capable of obliterating the evidence, so make sure you see what you need to see early on. Then you can start checking the various suspects' alibis and begin to draw conclusions.

Although there is no book with the game, as in the case of The Hobbit, the instruction booklet contains a few clues in the form of examples to help you start. At £14.95 Sherlock cannot be considered cheap, but on the other hand it did take 18 months to develop, and has finally been released six months later than expected. The wait has been worthwhile.

Chris Bourne

SHERLOCK
Memory: **48K**
Price: **£14.95**
Gilbert Factor: **9**

Dungeonmaster Magra



DESPITE adversities, the evil Magra and her creators, Carnell Software, have survived to offer inveterate adventure game players further mind-bending challenges. Long-awaited, **The Wrath of Magra** takes the adventure program one step nearer to full role-playing scenarios.

As in other Carnell adventures there are three episodes, each a program in its own right. Successful completion of one will provide the data password into the next.

With the package comes *The Book of Shadows,* a lengthy chronicle densely packed with information on the world of Magra. The second part of the book catalogues the creatures who inhabit this dangerous world. Attached to the creature catalogue is a grimoire, a book of spells. By careful study the player will learn how and when to gather magical ingredients and how to combine them to create spells which can be stored for combat or defence.

Although the Princess Edora was rescued from the Volcanic Dungeon she remained bewitched. Magra's body was returned to the Black Mountains by her Ice Giants and there restored to a demoniac travesty of life. Her powers are intact and she now thirsts for revenge. No one dares face her but you, driven as you are by the need to bring Edora back to the world of light.

At the beginning of the first episode you are placed in the valley of Di'Lief, where magic is powerless. Here you will have the opportunity to collect or purchase weapons or magical items and to find the way into the mines beneath the Black Mountains. The second episode takes you through those grim caverns where fearful monsters roam, guarding the entry into Magra's fortress. In the third and final part the adventurer must brave further savage creatures to encounter and destroy the witch herself. There are prizes for the first twenty successful warriors.

The screen display is in three parts. At the upper left appear the graphics. In the first episode pictures of the locations are shown, in the second the monsters are depicted, and in the final episode a map of the castle.

The upper right of the screen holds the status indicator, showing strength in points, spiritual power and faith. To make spells effectively the player needs faith and the more spells are cast the higher the faith value becomes. The time of day is displayed along with the phase of the moon. Certain spells can only be made in a particular phase and the player must take care to avoid wasting ingredients and power by performing magic at the wrong time.

A combat percentage is given which tells you what your chance of defeating an adversary is. The bottom half of the screen is for information and input, in standard text adventure style.

The computer keeps three main inventories for the player. There is the normal list of equipment and treasure and two specialised lists of magic phials, which contain spell ingredients, and spell cloths. Those cloths hold prepared spells ready for use in combat or similar situations.

The response to input is quite slow, but any Dungeons and Dragons fans will forgive this minor problem as the game is highly complex. In fact, the interpreter will take long entries of up to 59 characters which gets round the slow response time and cuts down on stop-start keyboard routines. Commands are also linkable.

A separate combat mode is used which not only takes account of spells and weaponry but balances strength and defence capabilities, similar to the routines used in **Volcanic Dungeon.**

Carnell have obviously made every effort to include as many aspects of role playing games as possible. Those efforts seem to have paid off. The Wrath of Magra takes a different direction from games like **The Hobbit** or **Valhalla** and acts as a Dungeonmaster for the player. Its sophistication should not be measured in terms of its ability to understand long sentences but by its strength in allowing the player to develop a comprehensive character whose identity will depend on conscious decisions and choices, not simply programmed chance.

Richard Price

WRATH OF MAGRA
Memory: **48K**
Price: **£12.50**
Gilbert Factor: **8**

Defeat dyslexia

A PROGRAM review is not the place to begin a discussion of dyslexia, a term hotly disputed among educationalists. Suffice it to say that **Dyslexia Beater** is aimed at children of average or above average ability from seven to 14 who experience reading difficulties, confuse left and right and muddle certain letters such as p, b and d.

Three levels of difficulty can be chosen, and three games are provided. In the Desert of Durg the player has to work through a maze of mines by pressing the cursor keys, first with the mines displayed and later when they are invisible. A mine detector screen indicates where the mines are.

In Crossing the Brax the player has to move a target right or left, to catch letters which match the target. Each successful catch builds an arch of a bridge.

Escape from Dyslexon involves steering a rocket ship through the green space gates while watching for flashing direction instructions. Refuelling has to be done by catching a yellow pod. Vaporisation occurs if the player is hit three times.

Compiled in machine code, the games are fun and fast moving. A useful learning aid for use either in special classes or at home.

Theo Wood

DYSLEXIA BEATER
Memory: **48K**
Price: **£9.95**
Gilbert Factor: **8**

Cut-throat space trade



A TOUGH simulation of galactic trading, **Star Trader,** from Bug-Byte, combines commercial cunning with arcade action to tax even the most wily Arthur Daley of the spaceways. Set in the crumbling, inflation-racked economy of the far future, the game features gangs of vicious pirates who roam the space trade routes preying on hard-pressed entrepreneurs who are attempting to keep the isolated communities supplied with the basic needs of civilised life.

As a businessman your motives are not totally philanthropic and you aim to rake in as much profit as possible by buying cheap, selling dear and reducing your overheads. Rapacity and greed rule the universe and customsmen, shopkeepers and criminals will do their best to rip you off or beat you up. Cash is also drained by the need to eat and drink frequently.

The simulation section consists of a number of menu-driven screens. The primary menu allows you to enter the stores of the commodity brokers, the spaceport or the pubs. Commodities can be bought in bulk and after a hazardous space trip are sold on to other planets. Report screens give details of prices on each planet and also provide cargo inventories and financial information.

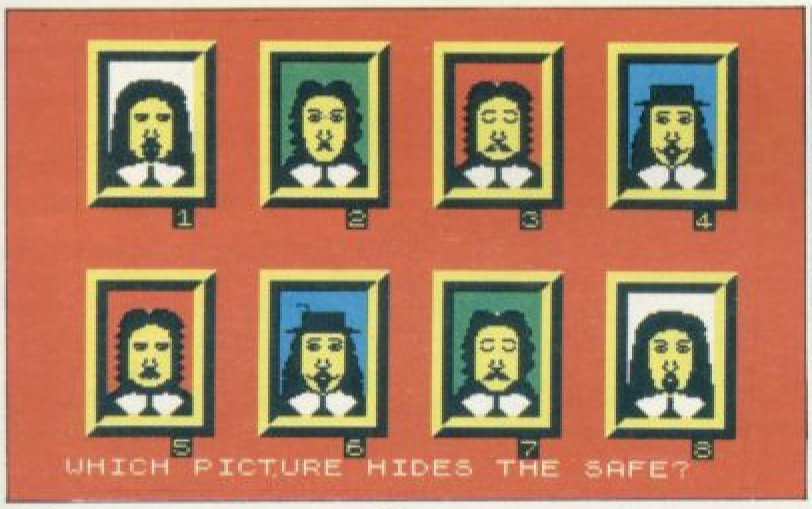
The space trip is an arcade sequence featuring the onslaught of the pirates. The player can fight or surrender, but the 'tax' levied by these interstellar Mafiosi is enormous. If planets run out of goods their civilisations collapse and limit your market.

The program is well-designed with fast keyboard response and clear screen displays. Static graphic illustrations adorn the simulation sections. Success in all parts of the game is hard-won and careful planning is needed, especially in calculating the size of a bribe. All in all Star Trader is a complex multi-task simulation which may well have you head-banging your Spectrum in frustration.

Richard Price

STAR TRADER
Memory: **48K**
Price: **£**
Joystick: **Kempston, Protek, Interface 2**
Gilbert Factor: **7**

Sweet dreams



LIKE OTHER educational adventure games **Castle of Dreams,** from Widgit Software, has a quest, locations and directional movement related to compass points. The quest is the removal of Klingsor's casket of evil spells from the castle. It differs from other adventures in that to move from certain locations the player has to complete a series of tasks.

Those tasks range from code breaking in the parchment room to tables testing across the mosaic floor. Widgit has ensured that effort does not go unrewarded, as the time allowed for key entry is slowed down after each unsuccessful attempt, making the task easier.

The program teaches mapping, and directional techniques, but has extra tasks which can operate on several levels. *Theo Wood*

CASTLE OF DREAMS
Memory: **48K**
Price: **£7.95**
Gilbert Factor: **7**

Jail bird escapes

DESCRIBED as an animated cartoon adventure **Rapscallion** from Bug-Byte is more a series of hazardous arcade screens interlinked and controlled by a central theme. The villain Rapscallion has stolen the title deeds to your castle and hurled you into the dungeon. A fairy princess turns you into a bird which enables you to escape.

From the dungeon you move through an assortment of rooms each of which contains various human, animal or physical dangers. Your aim is to find gems and informative pixies.

In the first section, the Wilderness, the task is to find a key to the Magic Labyrinth and a shield which will protect you from the guard. Once that is achieved the wizards who protect the castle gate must be approached, again after many dangers. If you avoid Rapscallion and enter the castle you will then need a magic wand to defeat him and win the deeds.

In all the sections you must trace and enlist the aid of friendly magical creatures. Losing a life turns you into a ghost. That lets you explore the screens of the current section unharmed but to continue the exploration properly your ghost must be reunited with your body. Making a map is recommended. In each new game the helpers and gems which give help are relocated.

Although the graphics seem rather blocky, the range of obstacles is enormous. There is also a save-game option. The graphics are not as sophisticated as **Atic-Atac** or **Manic Miner** but Rapscallion is still a difficult and complex game.

Richard Price

RAPSCALLION
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, Fuller, Protek, Interface 2**
Gilbert Factor: **6**

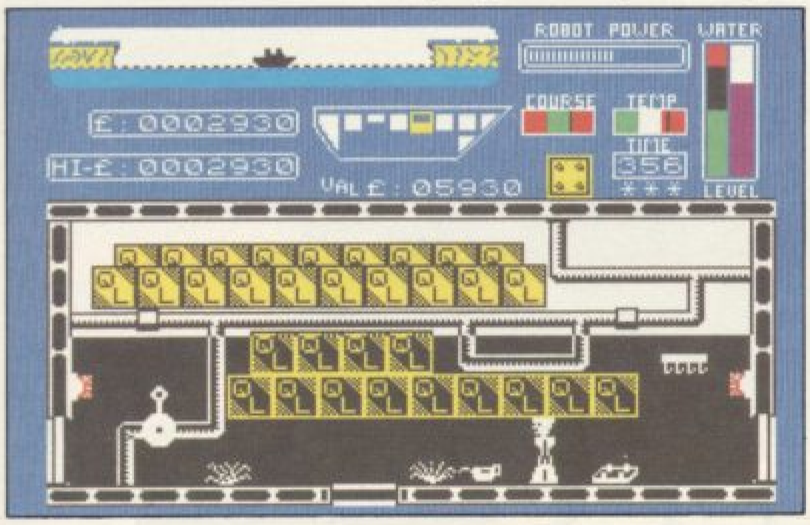

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Before the flood

IN THE LATEST hit from Silversoft, **Worse Things Happen at Sea,** you are a ship's android, with sole responsibility for the safety of the ship as it ferries its cargo between two ports. Unfortunately the vessel is not merely leaky, it is a positive sieve. There are two decks and you must travel backwards and forwards patching up the holes and pumping out water.

The screen shows a crisp picture of the compartment you are in, and gives information concerning the status of your engines, whether you are off course, and an overall plan of the ship.

As the game progresses the hull springs leaks, with cartoon-like fountains bursting out of the floor. Those can be capped with a limited supply of plates, and there are also pumps which you can operate to remove water. You will find yourself rushing madly around the ship trying to stem the encroaching seawater; be careful opening doors between compartments as you may simply spread the water around.



The main criticism is the lack of provision for joysticks, although you can choose from a set of six key configurations, which should work with most joysticks as long as you know which keys your joystick uses.

Worse Things Happen at Sea is exciting to play, difficult to beat, and unusual in concept. Despite the joystick quibble, worse things have happened in computer games, too.

Chris Bourne

WORSE THINGS HAPPEN AT SEA
Memory: **48K**
Price: **£5.95**
Gilbert Factor: **7**

Unhappy hooker?

CRAZY CRANES from Voyager Software has a straightforward arcade concept behind it. The player must perform the same task over and over again and, as the score builds up, speed increases and other dangers are introduced.

The screen depicts a dock crane and a loading bay beneath it. The crane's arm stretches out over the water and the player must move the hook along the arm. Ships loaded with several different types of cargo move across the screen toward the crane and the cargoes are hooked by lowering the winch.

When five items are safely stowed in the bay the next level is reached. If the player misses an item it will disintegrate on the edge of the dock. After a few levels missiles cut across the dock and sever the hook.

The graphics are drawn simply, though they are adequate given the restricted scope of the game. Like many of these repetitive games, the task can become compulsive though the lack of real variation counts against it.

Richard Price

CRAZY CRANE
Memory: **16K**
Price: **£5.50**
Gilbert Factor: **5**

Computer dealer goes bust

CARD GAMES such as Bridge enjoy obvious benefits from computerised versions, which can act as tutors in enhancing players' skills. Games of chance are another matter as the excitement lies in the bluffing and risk taking. Computers cannot provide the atmosphere and tension which comes from human interaction.

MFM Software have produced **Double Dealer,** a program which offers both Blackjack — pontoon — and five card Stud Poker. In both options the cards are displayed clearly on a green background with a prompt and betting window beneath.

In Blackjack the player can split, stick or twist as well as lay out money from the initial float of £3,000. The Poker option allows you to raise, fold or look at your own blind card and offers four levels of play, each with larger financial limits on each bet.

There is no two-player option and that could be seen as a severe limitation especially since the player's only inputs are to register bets or to make decisions on folding, sticking and so on. After a time the whole business seems rather passive, hardly the fantastic, superb and exciting game promised by the hyberbole of the cassette inlay.

Richard Price

DOUBLE DEALER
Memory: **48K**
Price: **£6.50**
Gilbert Factor: **5**

Frankie goes manic

THE CONSTRUCTION of monsters is a laborious task at best, but the job is made doubly difficult in **Frank N Stein** from PSS. Not only do you have to collect the spare parts before you switch on the juice, but there are numerous smaller monsters and hazards threatening your project as well.

The game bears a close resemblance to **Manic Miner,** in that you must leap from platform to platform to collect the objects you need, dodging the various hazards.

When the monster is assembled, alive and kicking, he goes on the rampage, and you must climb to the switch to turn him off.

Unfortunately, Frank cannot endure solitude, so back he goes to construct a new monster.

Derivative though it may be, Frank N Stein is fun and well-presented. PSS claims there are fifty screens in the game, so it should keep Manic Miner fans occupied for a few weeks. The graphics are neat and do suggest a Victorian-style mansion without being over-fussy in detail.

Chris Bourne

FRANK N STEIN
Memory: **48K**
Price: **£5.95**
Joystick: **Protek, Kempston, Interface 2**
Gilbert Factor: **7**



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Giant anticlimax

ONCE UPON a time Jack was going to market to sell the family cow. But on the way he met a sales rep from Thor who offered him a copy of **Jack and the Beanstalk** in exchange for the animal.

Jack said "Whoopee", and took the game home.

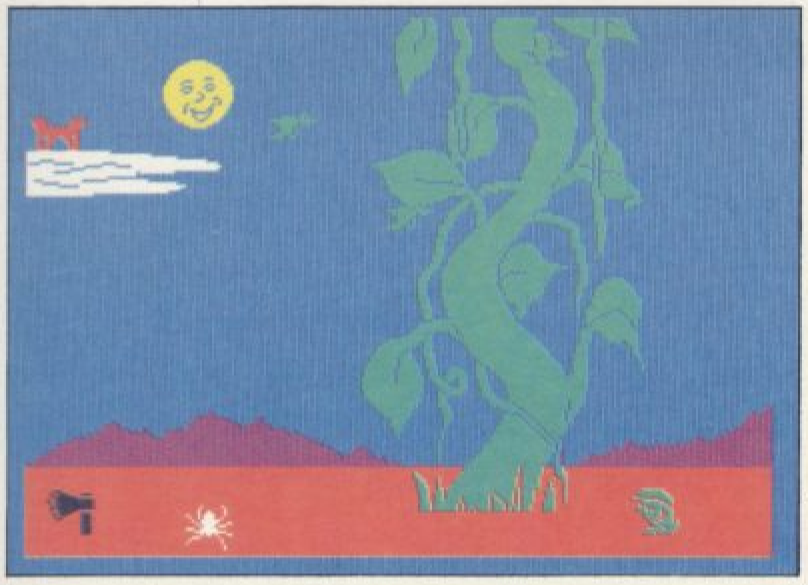
Jack's mother was hopping mad when she found out what Jack had done and sent him to bed with no dinner. So Jack loaded the game and began to play.

He was very impressed by the graphics on the first screen, which showed a giant beanstalk climbing into the clouds. Avoiding the spider and the birds, he collected his magic axe and began to climb. After falling off about forty times he got the hang of it and soon found himself at the foot of the giant's castle. Unfortunately there seemed to be no way of progressing further; some of the blocks could be climbed but as far as getting up the whole wall went, Jack could find no way of doing it.

While playing the game Jack noticed that the colours were not very well organised, as they spilled over onto other parts of the picture, and the moving objects flickered, causing his eyes to ache. When his mother came in the next morning she found Jack huddled under the bed, completely blind and muttering to himself.

Moral: Just because a game has pretty pictures doesn't mean it's worth more than a bag of old beans.

Chris Bourne



JACK AND THE BEANSTALK
Memory: **48K**
Price: **£5.95**
Joystick: **Kempston, Cursor**
Gilbert Factor: **5**

More Othello

CP SOFTWARE produces a range of traditional games for the Spectrum. Those computerised versions are invariably competent and testing though they naturally lack the feel of the real thing. Their greatest virtue is that players can play alone against the machine if they are unable to find a partner and can thus build up skill levels.

ZX Reversi is the standard Othello game in which each player must trap pieces of another colour, thereby reversing the colour. Play continues until the board is full and the winner has the most pieces. Thought provoking and entertaining, the game can give valuable lessons in logical thinking, as silly mistakes can alter the entire balance of power. The program has 11 levels of play; at the upper levels, suitable for extended play or problem solving, response times tend to be longer depending on the complexity of the positions handled.

One or two players can take part and there is a full-game automatic mode which is admirably suited for learning the game. Illegal moves are not accepted and a move can be recommended if required. The colours of both board and pieces can be altered to taste. Although there is no Save option the board can be set up or changed prior to playing.

Like most of the CP programs ZX Reversi is well made and the graphic display simple and clear. The colour change option is particularly useful and helps to add a little spice to things. It is annoying, however, to see simple spelling mistakes on the screen prompts. The game is nevertheless demanding and absorbing, guaranteed to give Othello addicts a good run for their money.

Richard Price

ZX REVERSI
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **7**

Snow business

WHEN penguins are not jumping off icebergs for David Attenborough, they spend their time hunting snow bees. If you have never heard of snow bees, it is probably because the penguins are very good at killing them. That peculiar ecological cycle is demonstrated in a new game from Profisoft, a West German software company.

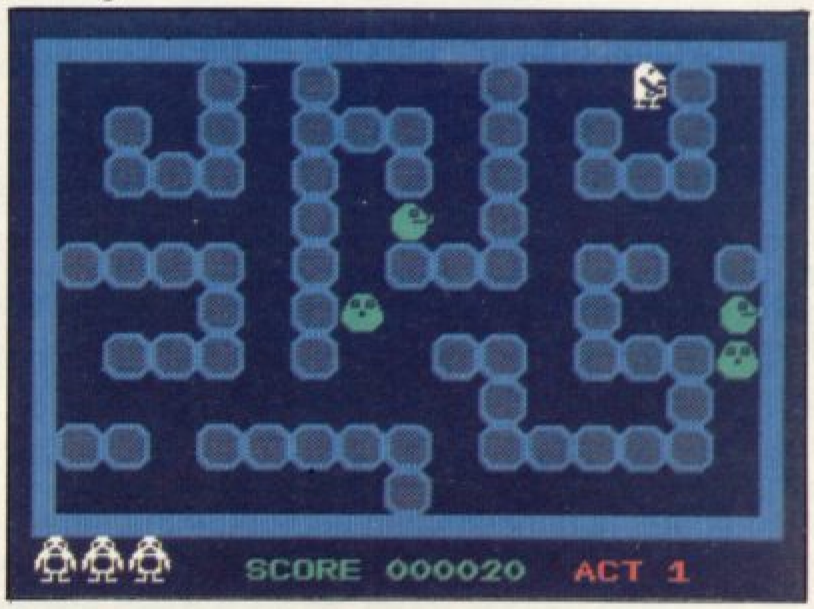
In **Pingo** you are the penguin, inhabiting a maze of ice blocks. The deadly snow bees will kill you if you touch, but they can be destroyed by pushing blocks of ice at them. Pushing the blocks of ice alters the configuration of the maze, so there is scope for strategic thinking as well as quick reactions in the game.

The graphics have a workmanlike chunkiness about them. New screens involve more bees, so the game rapidly develops into a considerable challenge.

Penguin durch technik, as they say in Germany.

Chris Bourne

PINGO
Memory: **48K**
Price: **£5.95**
Joystick: **Cursor**
Gilbert Factor: **6**





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TT trail blazer

GRAND PRIX motorcycling has increased in popularity tremendously over the past few years, so it was probably inevitable that someone would attempt to simulate the sport on a computer. Following the path blazed by Psion with the Formula One simulation, **Chequered Flag,** Micromega have produced **Full Throttle,** a hair-raising version of the Grand Prix 500cc TT races.

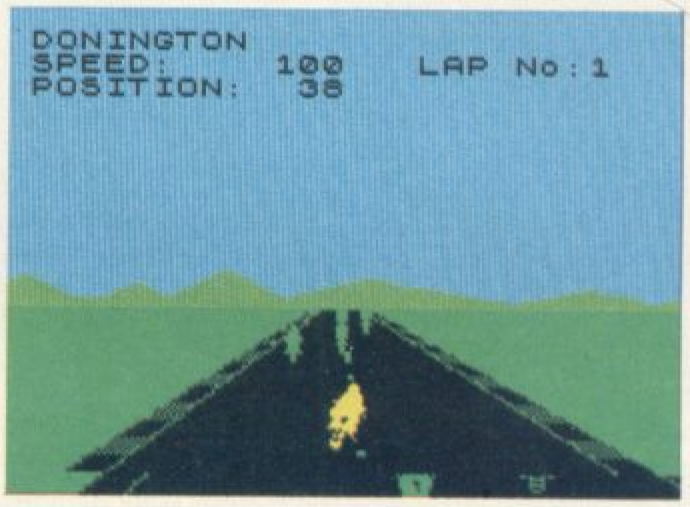
The game involves a race against forty bikers around any one of ten carefully simulated tracks. The controls are simple — accelerate, decelerate, left and right. There is also a practice mode to give you a chance to familiarise yourself with the track.

The simulation is not as accurate as Chequered Flag, with 0-175mph in under three seconds, but the controls are extremely sensitive, and the bobbing and weaving of the riders lends considerable atmosphere. You should aim to take the lefthanders fast and the righthanders slow — if you hit the edge of the track you lose speed, and if you collide with another rider your speed drops to zero.

Graphics are not of the best quality, but on the whole match Chequered Flag, with a similar mountainous horizon and smoothly shifting track. The bikes themselves flicker, but with at least three or four in view at a time that is not surprising.

Beware; Full Throttle is maddeningly difficult. It took us many hours to achieve 39th out of 40 on the easiest circuit; the best attempt was 25th in Yugoslavia. Despite that the game is as addictive as any race game on the market.

Chris Bourne



FULL THROTTLE
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, Protek, Interface 2**
Gilbert Factor: **8**

Auto-cue for Wally

MANIC MINER has set a standard which is very hard to beat and there are by now many variants on the split-level hazard avoidance game. **Automania,** produced by Mikro-Gen, is one respectable version.

The scenario is a garage workshop where Wally, the rather untidy mechanic, is attempting to assemble cars. Wally must negotiate suitably automobilic hazards to leave the workshop and enter the stock room to collect the next part for the car he is putting together.

On the ground floor tyres bounce along and must be jumped over to avoid instant termination. Ladders lead to the two other tiers. Those platforms have moving gaps. If Wally falls he is killed. There are also various items littered about which must be hurdled. The hazards change after each car is completed and become progressively more difficult, though the format is essentially the same. That results in a repetitive quality which, if you're not overkeen on the scenario, can seem monotonous after a while.



The graphics are bold and colourful and Wally responds well to the controls, though he strolls along at a leisurely pace to make jumping more hazardous. There is a full demo mode, high score facility and timer. Mikro-Gen also offer a £100 prize for the month's highest score. Although the alternative title on the insert is 'Manic Mechanic', this program, whilst difficult and well-made, does not have the range of screens of Miner Willy's nightmare world and loses out by inviting comparisons.

Richard Price

AUTOMANIA
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, Interface Two**
Gilbert Factor: **6**

Spelling tester

BLOCKBUSTER, from Compusound, is a two-tape package with the second tape bearing a new set of questions for this quiz.

On LOADing there is a choice of one or two players, sound and difficulty level ranging from one to nine. A board containing boxes marked with letters appears on the screen and whichever player answers a question correctly can choose another letter.

The difficulty levels are mainly dependent on speed of response for the player has to be very quick to answer the question, and at that level the computer response is always correct. Playing with two players requires a fast response on the part of either player.

As the questions are confined to a particular type, that of knowing the word that fits the description, the value of the program in educational terms is in practising definitions and spellings. Apart from that, **Blockbuster** is fun to play and reasonably priced.

Theo Wood

BLOCKBUSTER
Memory: **48K**
Price: **£5.95**
Gilbert Factor: **7**

On course for hell

DEEP IN space, the giant colony ship *Snowball* hurtles towards its destination in the system of Eridani A. Formed of ten enormous passenger discs, within which sleep millions of pioneers, the vessel is powered by accelerator units fuelled with ammonia ice. The ice is wrapped in a mass around the discs and gives the ship its name.

All the ship's functions are carried out by machines and the eerie passages of the vessel are patrolled by Nightingales, dangerous robot guards. But . . . something has gone wrong aboard *Snowball* and you — Kim Kimberley, the ship's security agent — are woken from hibernation. *Snowball* is heading straight into the nuclear hell of its target star.

Those are the bones of the plot of the Level 9 classic text-only adventure **Snowball.** As with all their adventures no space is wasted on graphics and the program is enormous, having 7,000 locations, hundreds of messages and tricky puzzles to solve. The number of locations is achieved by having each passenger disc designed exactly alike. Another innovation is a woman as the central character and the scenario itself is consistent and well-planned, depicting a believable science fiction world.

To score you must achieve significant steps in your attempt to reach the control unit and everything you find will have some sort of function. Working out those functions is a major aspect of the adventure. First you must escape from your freezer coffin and assemble a space suit. On your journey through the immense vessel you will be given lengthy location descriptions befitting the complexity of the *Snowball* and there is a wealth of detail to take in. The setting is highly atmospheric and imaginative. The interpreter will accept relatively complex language and is versatile in its responses, a feature which enhances the overall effect.

The accompanying booklet gives the player a background summary of the political set-up behind *Snowball's* mission. Level 9 will also provide cluesheets if required — and you will probably need one.

This is only a brief outline of what is an outstanding adventure. Play it . . . you've got a snowball's chance in hell but it's possible you may succeed.

Richard Price

SNOWBALL
Memory: **48K**
Price: **£9.90**
Gilbert Factor: **9**



Pyramid fun

TURNED into a toad by the spells of Griselda the Necromancer, you must race down a pyramid of steps to escape from the fortress. Every step must be covered before escape is possible. Devils, skulls and ghosts chase you round the pyramid threatening instant death.

This is the Q-bert style arcade format of **Spellbound** from Beyond Software. You have three lives on each of the twelve levels. The skins of previous lives hang in a spider's web above the playing area and lightning bolts shoot from the cauldron where Griselda sits stirring. Timer and current score are shown beneath the pyramid. The attacking creatures multiply from level to level and your chances get slimmer.

The insert does not specify any joystick simply suggesting that a 'relevant' one be used. Certainly there is no great advantage in a stick as the toad hops rather than glides. And with a stick it is tempting to hold on too long and vanish in a puff of smoke over the edge.

A fine game which will keep pyramid addicts on the edge of their sarcophagi.

Richard Price

SPELLBOUND
Memory: **48K**
Price: **£5.95**
Joystick: **Not specified**
Gilbert Factor: **7**

Escape to boredom

ALCATRAZ Harry, from Mastertronic, captures the essence of prison life brilliantly — intense boredom. It is a maze game in which you must find secret files and amass equipment before escaping.

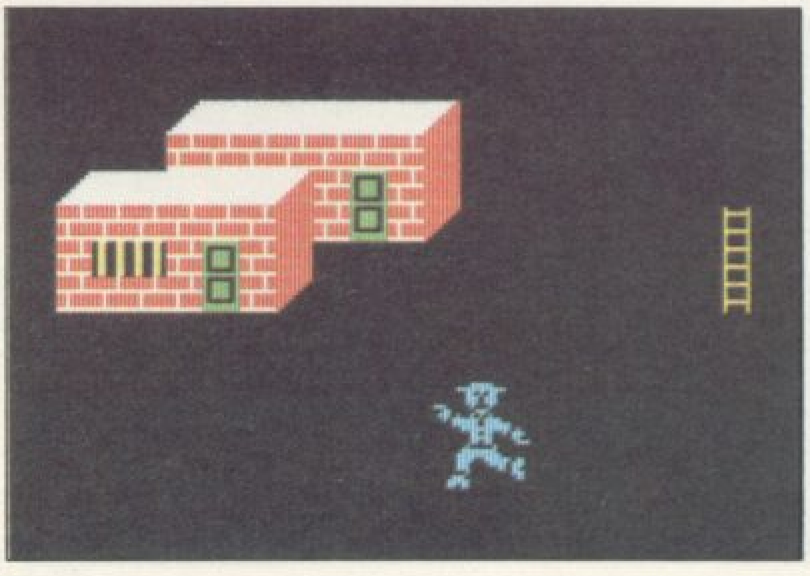
The maze is a grid containing a scattered selection of revolvers, ladders, wirecutters and similar objects. There are also guards to complicate the route.

The graphics are flickery, and although there are a great number of screens, there is very little detail in each one; a few simple buildings or a watchtower at best. Movement is slow, and although the scenario seems promising at first, it rapidly palls through lack of variety.

For the low price, the game is adequate. But in terms of quality, the game falls way short of what is possible.

Chris Bourne

ALCATRAZ HARRY
Memory: **48K**
Price: **£1.99**
Gilbert Factor: **3**




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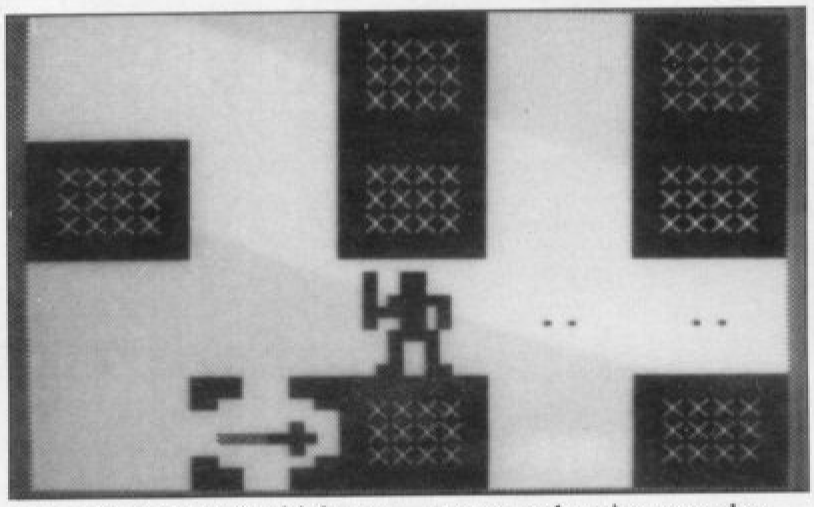
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Classics from Bug-Byte

ONE COMPANY which has been producing software for the ZX-81 almost from the beginning is Bug-Byte. A number of its titles are still available, and are worth a look in spite of their antiquity.

Dictator still ranks as one of the best 'land management' games and may be familiar to Spectrum owners in the version produced by dk'tronics. The original version from Bug-Byte casts you as the despotic ruler of a banana republic. Your objective is to balance the country's factions, setting one against the other, while amassing as much loot as you can from the meagre budget which you transfer to your Swiss Bank Account. Then you must wait for the inevitable revolution and your chance to escape during the turmoil.



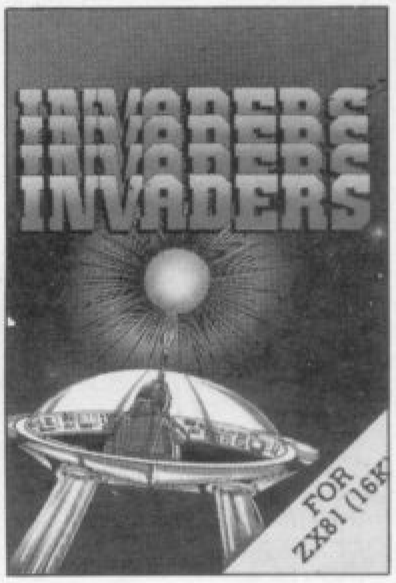
Dictator is a very funny game, and quite complex — not only must you worry about the factions, peasants' army and landowners, but you also have to contend with guerillas, the Secret Police, and foreign powers. The USA and the USSR are both prepared to lend you solid currency, but your internal policies may not please them.

Invaders is a version of Space Invaders. What can be said about the game that has not been said before? The Bug-Byte version has ten different speed-levels which cater for a broad range of skills; at the fastest level it is very difficult indeed. One forgets how enjoyable the game was when it first came out; only a few years have passed, but now nobody would dream of bringing out a version. The game is competent, but only worth buying if you cannot find a more up-to-date space game in the shops.

Adventure was one of the early text adventures for the machine, and still retains its appeal. Although the two-word input and lean descriptions seem antiquated today, the game is nevertheless playable with a wide vocabulary of 80 words. Briefly, you must collect three pieces of the royal sceptre and return it. The response time is reasonably fast for the machine, although much of the program is written in Basic with only a short code routine to pep things up.

The star in the Bug-Byte range, however, is **Mazogs.** You must run through an extensive maze in a quest for the treasure. The tentacular mazogs will kill you if they can, but you may defeat them with swords. There are also prisoners in the maze who will give you help in finding your way to the treasure.

The game is fast moving, and very difficult at the highest level, where the mazogs move around purposefully and not for your benefit. The graphics are very large — a screen display is pictured above — and the maze scrolls quickly. Mazogs was the company's first big hit, and still compares very favourably with much newer and



supposedly more sophisticated products. It has become something of a ZX-81 classic, and would be a worthy addition to anybody's collection.

Chris Bourne

DICTATOR
Memory: **16k**
Price: **£5.95**
Gilbert Factor: **7**

INVADERS
Memory: **16k**
Price: **£4.95**
Gilbert Factor: **5**

ADVENTURE
Memory: **16k**
Price: **£5.95**
Gilbert Factor: **6**

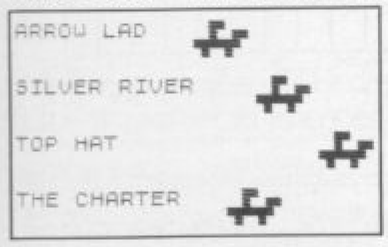
MAZOGS
Memory: **16k**
Price: **£7.95**
Gilbert Factor: **8**

The slow stakes

FOLLOWERS OF the turf may enjoy emulating the great racehorse trainers in these two simulations of the Sport of Kings.

Racing League starts on the premise that the Racing Authorities have formed a league of famous people, including yourself, to race against each other to raise money. You get three horses, which are entered in various races. If you win or are placed you get prize money, and you can also bet on any of the horses. The object of the game is simply to survive, hopefully making enough money to buy up other horses and maybe even eliminate rival members of the league.

There are no graphics, and the game is rather slow, with long delays for the various tables to be displayed. The form of a horse affects its odds and chances in the race, but beyond trying to minimise losses with judicious betting there is little opportunity for real skill in the game.



Rather better is **Racehorse Trainer.** In this your horses are given ratings and an optimum distance, and you must select which horses you will race in which events. The race is displayed with chunky graphics — see below — and the results affect the ratings of each horse.

Racehorse Trainer does not approach the quality of **Football Manager** but it is enjoyable to play and the response times, though scarcely quick, are not so slow as to detract from the game.

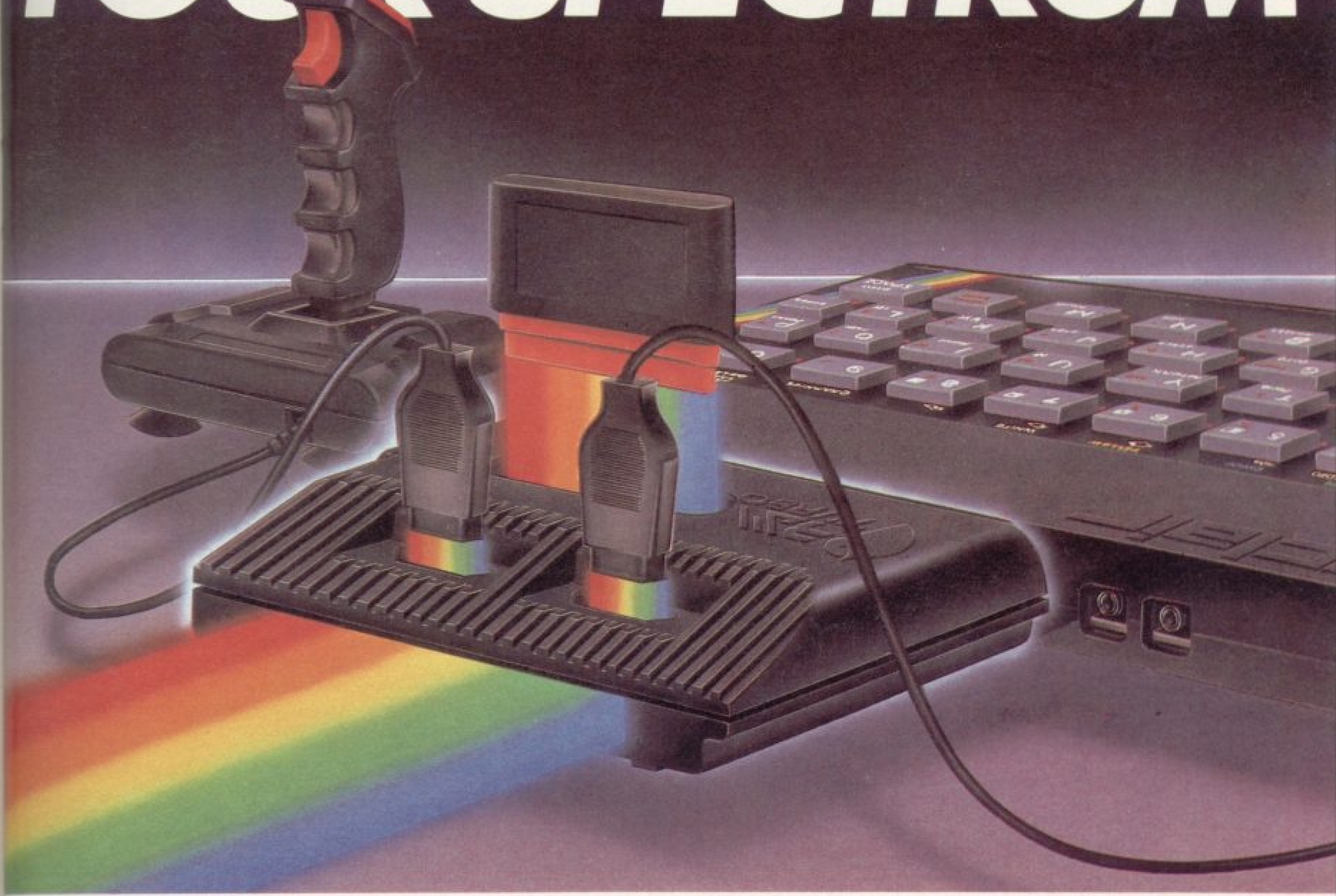
Racing League can be obtained from Racing League Software, 22 Lindale Garth, Kirkhamgate, Wakefield, West Yorkshire, while Racehorse Trainer is available from Gavin Barker, 12 Fleming Field, Shotton Colliery, County Durham.

Chris Bourne

RACING LEAGUE
Memory: **16k**
Price: **£3.50**
Gilbert Factor: **4**

RACEHORSE TRAINER
Memory: **16k**
Price: **£2.80**
Gilbert Factor: **6**

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Machine code tutors take the agony out of assembler language by simulating the workings of the Z-80A processor. John Gilbert attends the tutorial

UNTIL RECENTLY the term 'utility' has been used by software companies to mean any product which handles machine code, such as assemblers, disassemblers and toolkits. Those products help you to exploit the potential of the Spectrum giving enhanced graphics and sound and also provides aids for writing Basic programs such as line or block delete, memory available and REMkill.

The utility market has, however, expanded to include programs which provide you with information on how to use machine code or assembler language. Those programs could be classified as educational but most of them also include utility routines which simulate the Spectrum Z-80A microprocessor and allow you to experiment with machine code in an environment controlled by the program so that any errors do not cause a crash.

The first of such programs to be released was **Beyond Basic** produced by Sinclair Research with the help of Incognito Software. The back of the cassette package primes the purchaser for an adventure into the world of assembly language in which they will be guided by the Spectrum through the intricate workings of the Z-80 processor.

It is also claimed that the program will "take the agony out of machine code". That may be true but it also puts the agony into loading the program from cassette. Of the samples received at *Sinclair User* only one would load and that was after it had been coaxed through the tape deck several times.

Unfortunately, the crashes made it evident that most of Beyond Basic has, ironically, been written in slow-moving Basic. It therefore has a greater tendency to crash and is slower and less polished than if the program had been written in machine code.

Once loaded, the package displays four options, three of which correspond to sections of the program which deal with lessons and examples of assembly language and the fourth sends the machine back into Basic. The last option is pointless as you can go back into Basic at any time by pressing the BREAK key.

The first section explains how information is stored within the Spectrum and provides details on the machine registers through which information is passed to and from the other chips and in which the results of calculations are stored.

At first no machine code instructions are explained. The author provides a set of pseudo-instructions which are not Basic or machine code commands but bridge the gap between the two languages. You might think that is a good idea but could get confused when real assembly language instructions are introduced and the pseudo-instructions are discarded.

The second section on the tape give a brief rundown of standard assembler mnemonics. The rundown is a little brief and explanations which would require a whole chapter in a book on the same subject are given only one or two screens.

The final part of the tutor involves writing and running your own machine code program using the Beyond Basic version of a Z-80 simulator. Once the program has been entered you can watch how the registers and internal memory change as each instruction is effected. When it has run you can edit the lines of code and watch sections of your program run if de-bugging is necessary.

The potential of a real simulator and effective lessons in machine code seems to have eluded Incognito with Beyond Basic. Sinclair Research states that the philosophy behind the package is one of simplicity. It is not simple to use, its

continued on page 53

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style is not simple to learn from and it is certainly not simple to load.

The Complete Machine Code Tutor, from New Generation Software, is unlike Beyond Basic in one respect: it is simple to use. It provides a series of 33 lessons covering all aspects of assembly language programming together with a powerful simulator program on which you can run examples and write your own routines without fear of fatal crashes.

The simulator makes the package better than a book and the lessons are comprehensive enough to help even the beginner who has failed to learn from other texts. The package also succeeds because it does not adopt the style of the huge tomes about machine code which so often take pride of place in bookshops. It is also more helpful than a book as it draws attention to any ideas that you have failed to understand in a lesson. The package is very user-friendly in that respect and if an error does occur the computer not only locates and explains it but also gives you the opportunity to try again with some help from the Spectrum.

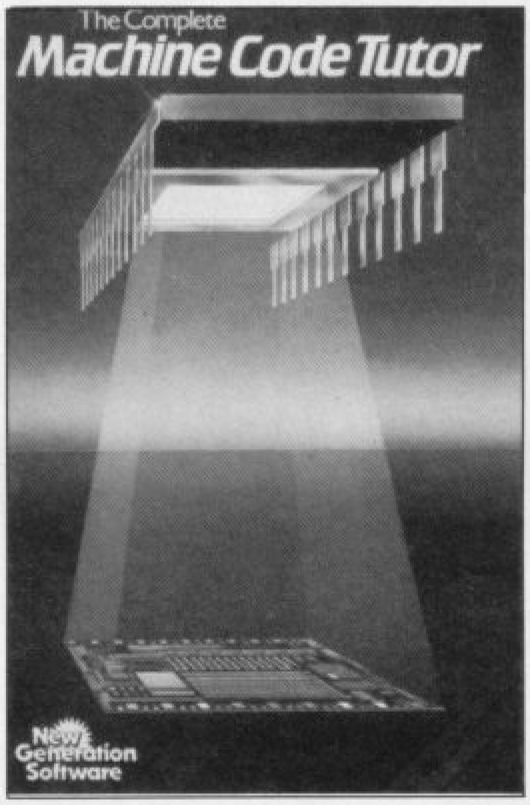
It is hard to crash the Tutor, even when loading one of the lessons. If a tape-loading error occurs the Spectrum will not crash, which is the case with Beyond Basic, but a message is displayed on the screen showing that an error has occured and asking if you still want to load the next lesson. If not the package returns to the main menu of the previous set of lessons.

The Complete Machine Code Tutor provides an excellent introduction to assembly language. It may not give the necessary spur to beginners who want to give up Basic and become machine code programmers but it will give an extra push to those who are already committed to going through the agony of learning machine code from a book.



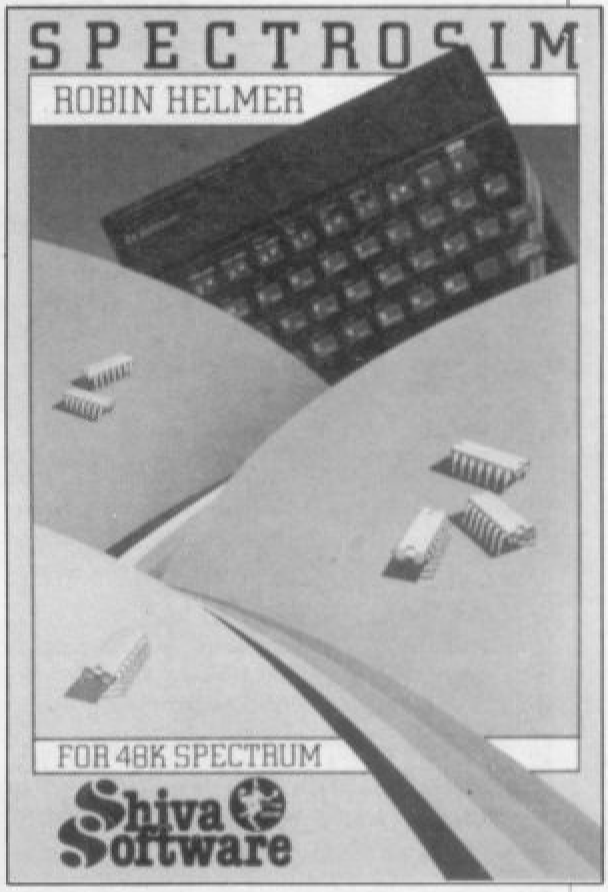
The same cannot be said of **Spectrosim,** from Shiva Software. As with Beyond Basic it is written in Sinclair Basic which, of course, the program is attempting to encourage users to replace with machine code.

The package is a Z-80 simulator but has none of the power or attraction of its rival from New Generation. While The Complete Machine Code Tutor can handle 16-bit registers as well as eight-bit in its simulator, Spectrosim can only handle the eight-bit registers from A-D. No mention is made of the E,F,G,H, and L registers which all have special jobs within the Z-80. That means that the true power of the chip is not simulated.



New Generation have an excuse for cutting back its simulator on the grounds of memory restrictions but Shiva has none. If the author could not get a full simulator to fit into 32K using Basic he should perhaps take lessons from his own book and write it in machine code to make it fit within the Spectrum RAM. That would have been better than releasing a product which many intermediate Basic programmers could write.

The main menu of Spectrosim provides nine options, the titles of which may prove confusing to the beginner. For instance, the term 'load' is used twice in the menu. The first option is 'Load program'. You might think that you have to reach for the tape recorder and the LOAD key but the author means that you should start typing in a program from the keyboard. There is also a Tape-Load option but even someone with some knowledge of computer buzzwords might get confused at the terminology.



The other main display within Spectrosim is one in which the contents of the Z-80 registers and flags are shown together with the current program name and the number of instructions which have been processed so far by the simulator. It is immediately obvious that only three of the six main system flags can be used by the simulator and those are Carry, Zero, and Sign. They are the most important of the flags that you can change but the omission of the others is a gross oversight.

The best aspect of the package is the 44-page booklet included as an aid to working the simulator. It includes the assembly language instructions which can be used with the simulator, some of which do not correspond to Z-80 assembly mnemonics. It is, however, more helpful than the program could ever be in showing the potential of Z-80 code.

Once you have finished learning about machine code you will need an assembler or monitor to help you put your program into the Spectrum. One of the only assemblers available for both the 16K and 48K machines is the **ZX Spectrum Machine Code Assem-**

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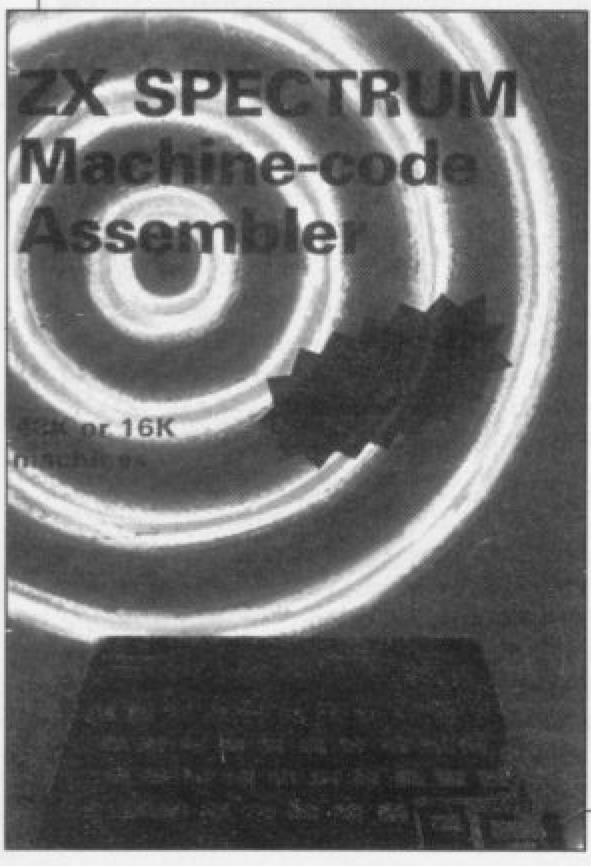
bler from McGraw-Hill.

The software allows the use of full standard Z-80 mnemonics and also includes the usual time-saving devices to make the computer assemble at a given address and define blocks of data or text strings within a program. If you make an error the program provides adequate error messages and allows you to correct the usual mistakes which often occur when you are learning about machine code.

Unfortunately the way in which you have to write assembly language programs is made difficult by the program and errors are bound to creep into even an expert's program. The assembly code has to be typed into REM statements within a Basic program. That may seem to make the job easier but, without the neat display of a full screen editor with which most assemblers are equipped, your code will soon turn into a jumble of instructions.

The other problem with the assembler is the instructions, or lack of them. The purchaser is supplied with eight pages of text which give a quick introduction to the program and a few example routines. It is written in a style that few beginners would understand and few experts will bother to read. The assembler may be as powerful as most others on the market but it will lose customers when they learn that the instructions are so sparse and the program is so unfriendly.

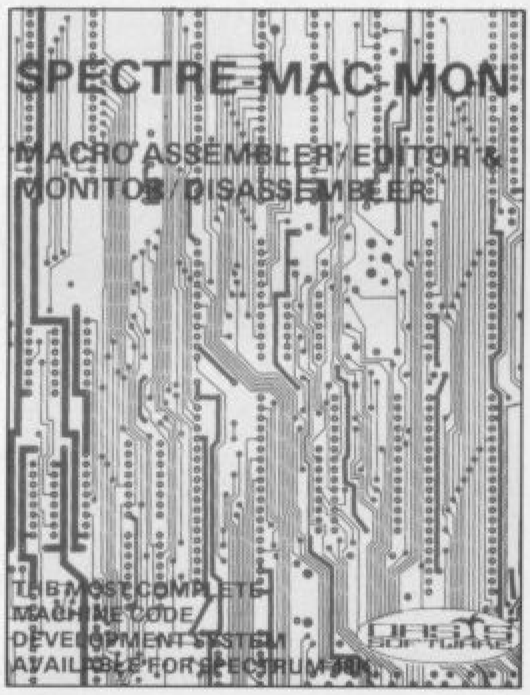
If the assembler from McGraw-Hill does not sound enchanting then you might be more inclined to buy **Spectre-Mac-Mon,** a complete machine code development system from Oasis Software. The publisher has given it a grand name and the product certainly deserves it.



The package includes a 48K assembler and a 16K monitor both of which are microdrive-compatible. Spectre-Mac, the Editor/Assembler, is the most impressive part of the package. The full-screen editor allows up to 254 characters on one line and will scroll sideways to the left when the cursor reaches the righthand side of the screen.

The assembler includes commands which cover any eventuality, including searching code files, deleting blocks of lines, merging and copying files and replacing one part of a file with new code. There is also a help option which will give you the key names of all the commands available through the assembler without the need to look through the well-written manual.

Spectre-Mac will also allow you to personalise commands so that you can



replace the Z-80 instruction set with one of your own. That would be helpful if you had learnt assembly code programming from a book that did not use standard mnemonics.

The tailoring of commands to your own needs is the icing on the cake as far as Spectre-Mac is concerned. It is an excellent product in its own right, but the addition of a monitor of an equally high standard on a separate tape makes the package even more attractive.

Spectre-Mon provides disassembly functions on both ROM and RAM with the ability to run machine code programs, stepping through them one instruction at a time.

Oasis has produced a powerful package which provides all the utilities which could be reasonably asked for by a machine code programmer. If, how-



ever, you do not want to write your own machine code routines you may want to use a toolkit such as **SuperCode II** from CP software.

That package includes 120 routines which can be used either when writing programs or within them. It covers utilities for sound graphics, error trapping of Basic programs and program protection. Supercode also includes a novel routine for entering and replaying a voice or music with the aid of a microphone or tape recorder.

The authors have thought of everything a Basic programmer might want to do in machine code but cannot.

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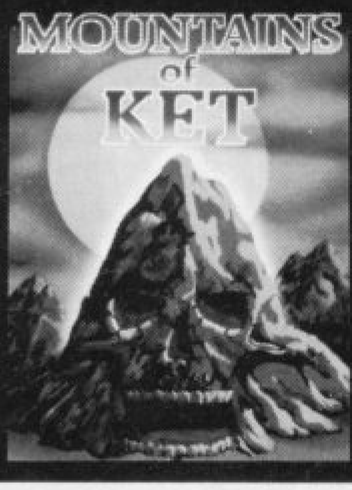
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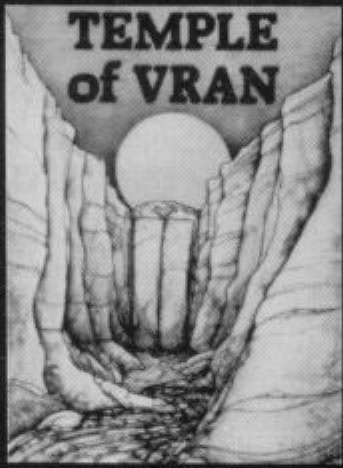
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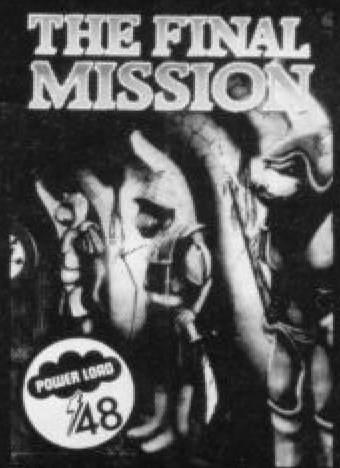
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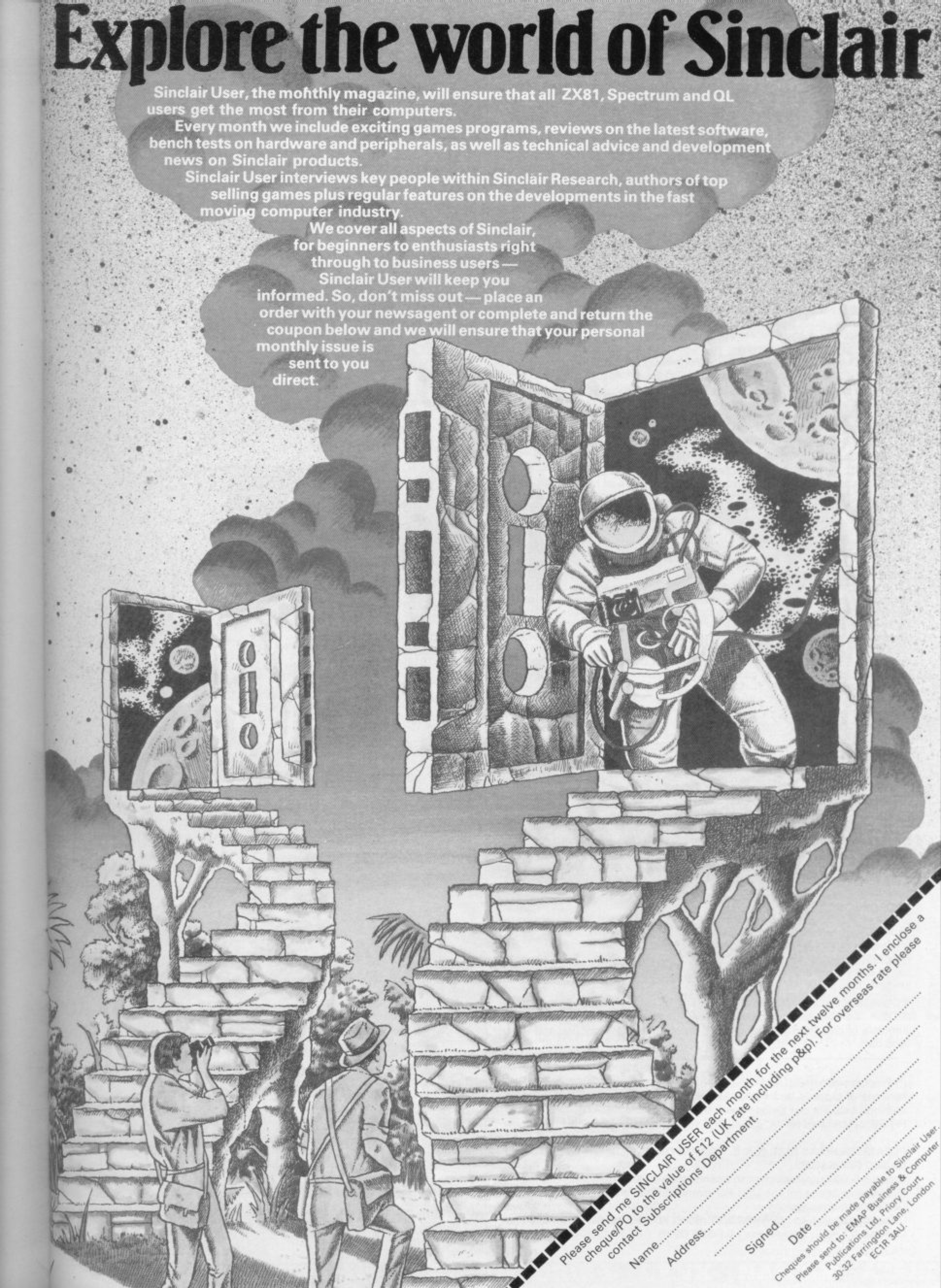
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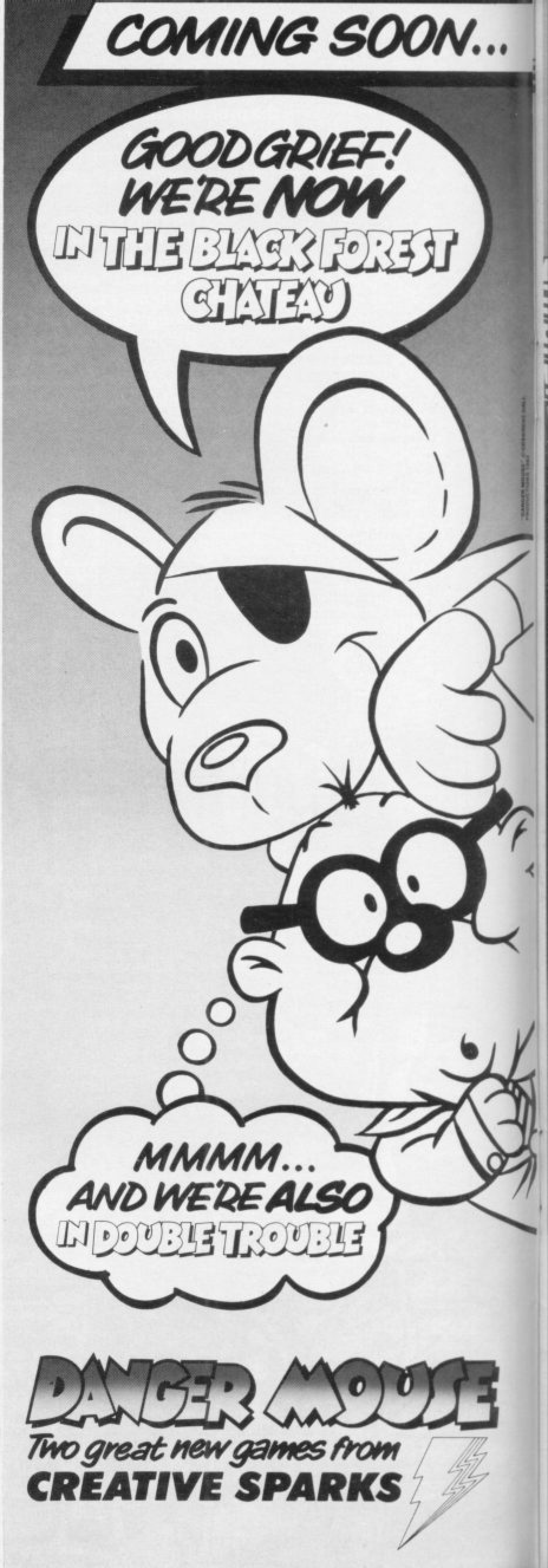
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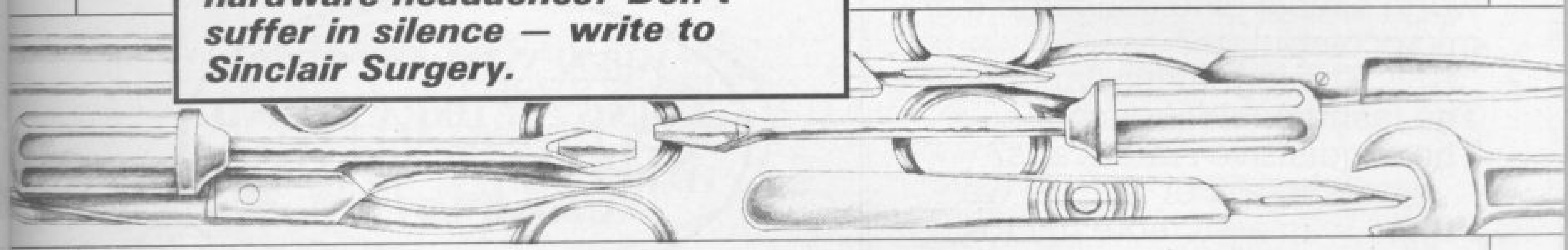
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Return of the wobble

PLUGGED into the back of my Spectrum I have a VTX 5000 modem, a 32K Rampack, a printer and a joystick. All are connected correctly but one slight wobble and the system crashes. Can you suggest any hardware to prevent this?

Steven Henty,
St. Leonards,
E. Sussex.

● *There are many ZX-81 owners who will sympathise with you as many of them have suffered from the infamous Rampack wobble. While many ingenious solutions were tried, including Velcro, sticky tape and superglue, none of them were completely satisfactory.*

The advice we can offer is that you should buy another flexible connector, similar to the one used on the VTX 5000 modem. Classified Product Services Ltd, Shire Hall, The Sands, Appleby-in-Westmoreland, Cumbria, CA16 6XN — tel 0930–52204 — sells a range from £8.50 upwards.

Tube takes the strain

I HAVE heard several rumours recently that computers ruin the tubes of colour televisions.

N I Brown,
Llangadog,
Dyfed.

● *I am afraid the rumours are true; using any computer with a domestic television will eventually leave its mark on the tube. Most computers use only a part of the screen, and always the same part. That means that the part used will, in effect, wear out faster than the rest of the screen and the join between the two areas can become noticeable.*

You should not worry too much as it would take many thousands of hours of computer use for that to happen and, with a new set, even longer.

Morse code SOS

WHERE CAN I obtain a program, cassette or cartridge for connecting a transceiver to my ZX-81 to enable me to send and receive Morse code?

K Pridmore
78 Saffrondale,
Anlaby,
Hull.

● *We do not know of any suitable hardware or software. Perhaps other readers can help.*

ZX-81 lacks colour

WITH REFERENCE to your advertisement in the November 1983 issue of *Sinclair User* about the DDC colour interface for the ZX-81. Is it still available?

SSGT J R Gadsdon,
262 Signal Squadron,
BFPO 58.

● *The DDC colour board for the ZX-81 is no longer available though you may be able to pick one up second-hand. It only worked on the ZX-81 and it used inverse characters to tell the interface to generate the colours.*

DIY port conversion

WHEN I BOUGHT my 48K Spectrum I was already the owner of an Olivetti Praxis 30 Electronic daisy-wheel typewriter. Is there any way my electronic typewriter can be converted to act as a letter-quality printer for the Spectrum? If it can, would it be able to cope with the 64-character generation per line of such programs as Tasword Two? Are there any computer companies who would handle such a conversion?

John Lamidey,
Kingston upon Thames,
Surrey.

● *Olivetti does not make a suitable computer port for the model 30 but a DIY design was published in the August 1983 issue of* Wireless World *by Neil Duffy.*

Wired for sound?

I HAVE HAD my 48K Spectrum for over a year and I have often wanted to put headphones on or cut the sound off completely. I have tried connecting headphones to the earphone socket but the sound still comes out of the speaker.

Michael Walsh,
County Down,
N Ireland.

● *If you want to cut off the sound while playing commercial games then the only way would be to cut the wires to the speaker or to rewrite the game, neither of which is to be recommended. If, however, you write machine code programs then it is possible.*

The speaker and EAR and MIC sockets are controlled by port 254 — FE in hex. The speaker uses bit 4 of the port, the MIC socket bit 3 in output and the EAR socket bit 6 in input. When the Spectrum produces a sound it sets and resets bit 4 very quickly. If, however, bit 3 is set then, due to the way the ULA works, the voltage to the speaker is reduced to the extent that it is not sufficient to drive it. Therefore, to mute the speaker either bit 3 must be set or it can be isolated to produce a signal at the MIC socket, as when a program is SAVEd. As the MIC and EAR sockets are connected the signal will also be present at both.

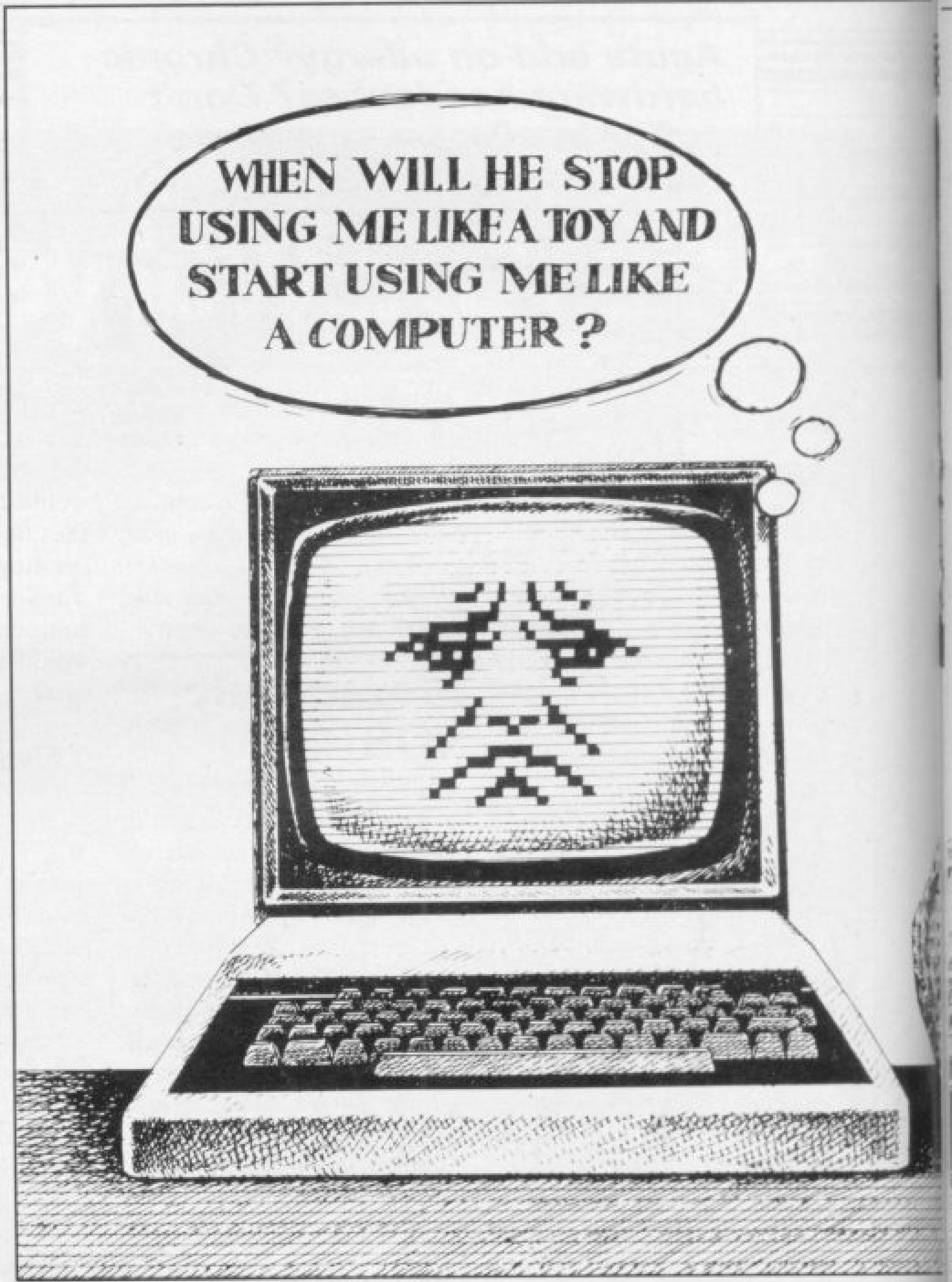
Which tape recorder?

I AM SHORTLY getting a ZX Spectrum and I have recently bought a Phillips cassette recorder. I'm not sure whether it's computer compatible. Please could you tell me whether I'll have to buy another cassette recorder for the Spectrum?

Julian Heald, aged 12,
Uxbridge,
Middlesex.

● *This is just one of many letters we have received on this subject. Almost any tape recorder can be used provided it has the correct sockets for the lead but there are three things that you should bear in mind. Firstly a mono deck should be used because if you use one track of a stereo deck the other unused track can generate unwanted noise. Secondly, choose one without an automatic level control because when SAVEing the signal that the Spectrum sends out can upset it. Lastly, a tone control is useful when LOADing as the treble signal needs to be boosted. As a general rule, the cheaper the recorder the better.*

If you are buying a cassette recorder to use with a computer then tell the salesperson in the shop. If for some reason you cannot get it to work you can return it and get a refund, explaining that it did not fit the purpose for which it was sold.



Now you and y
bring out the be

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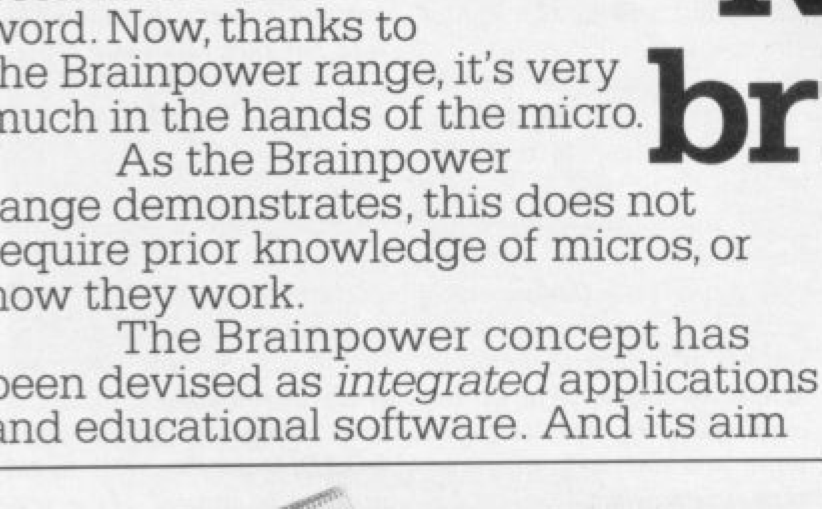
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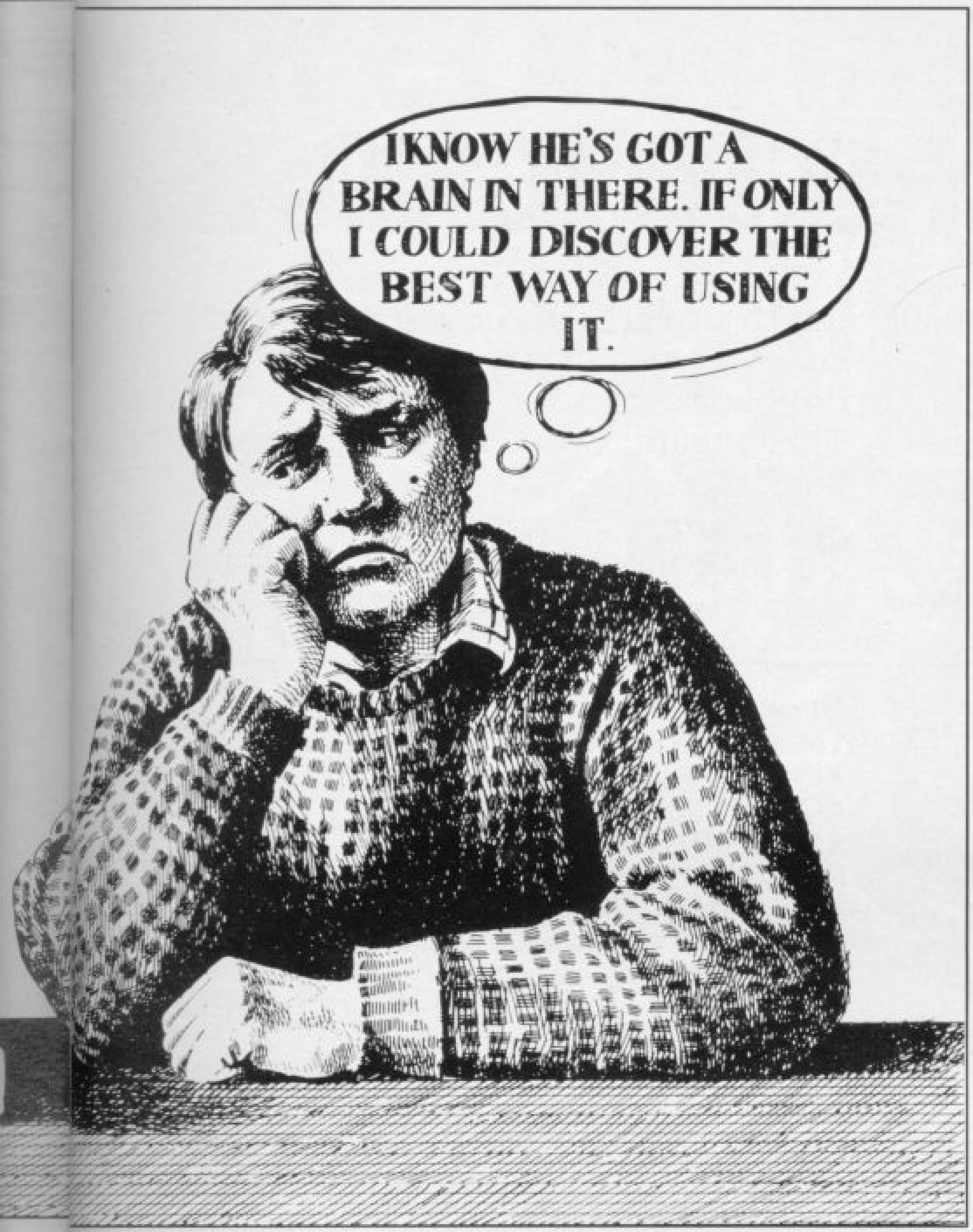


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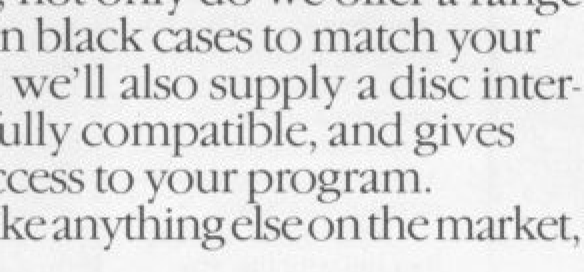
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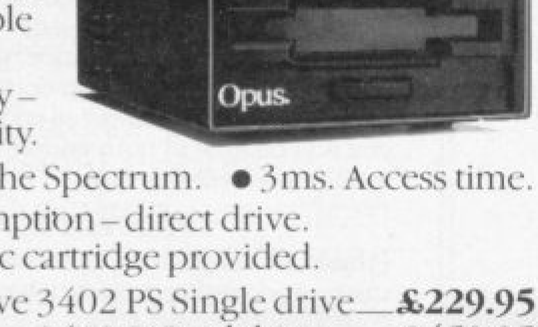
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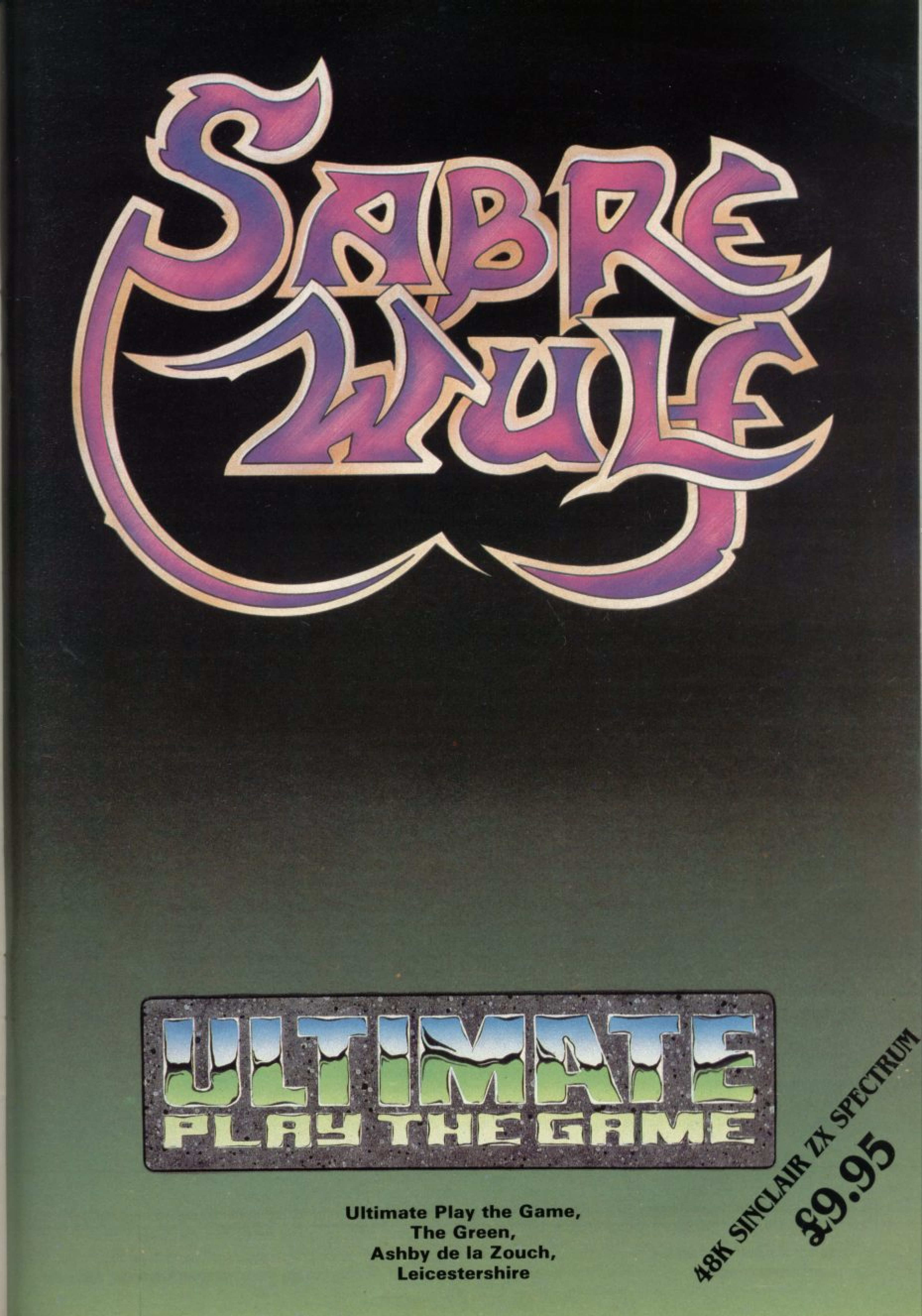
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Learning tool turns turtle

Sinclair Logo is the gateway to a new world. Theo Wood embarks on a voyage of discovery

THE ARRIVAL of the Sinclair version of **Logo** must be considered as the important event in the year as regards learning software.

Logo is the high level programming language developed at MIT — Massachusetts Institute of Technology — by Seymour Papert and his associates. In his book *Mindstorms* Papert outlined the reasons for the importance of Logo; it provides an introduction to computing for young people in that by controlling the micro-world of the turtle they become actively involved in computing processes. Moreover, mathematical ideas, especially geometry, are made concrete rather than abstract. Logo can also involve those whose background is in the humanities and bring them into contact with a technology that would otherwise seem strange and alien.

Sinclair Logo has been developed by the same team, Logo Computer Systems Inc., who developed the original Apple version as well as the Atari and IBM PC versions and, later this year, the implementation for the BBC micro. The Sinclair version includes a cassette tape with the program and two ring-bound manuals.

Logo I covers the use of turtle graphics and Logo II is a programmer's reference manual. There is also a Logo ready reference card. Logo is considered important in that, unlike Basic, it reinforces good programming techniques, encouraging the user to build a program through procedures rather than a spaghetti of GOTOs. That means a program can be structured by breaking each part into its smaller components before incorporating those into the larger structure of the complete program, reflecting the methods used in programming in the commercial world.

Once LOADed, Logo operates in three modes: Logo mode, TO mode and editing mode. In Logo mode any procedure or command such as BK 10, FD 10 — Back, Forward — will be executed on the screen immediately after ENTER has been pressed. That means that at a very early stage you can see the movements resulting from commands immediately and evaluate their success. There are two lines for commands and 22 lines for graphics.

The screen turtle takes the form of a triangle which shows the direction of the heading, although HT — Hide Turtle — will increase the speed at which the turtle can move around. Each procedure has to be started by the use of TO and the title of the procedure and, after this, each entry will be prompted by a > instead of the question mark for the Logo mode. Commands can be ENTERed until the end of the procedure, which is signified by END. The message will then come on the screen — for example, SQUARE defined. It is now possible to use SQUARE as a command in Logo mode.

The EDIT mode is entered by using the message ED " followed by the name of the procedure to be edited. The editor is powerful; not only can the cursor be moved in all four directions



by use of the cursor keys but there are many other useful features such as E MODE — extended mode — 5 which moves the cursor to the beginning of a line and E MODE E which moves the cursor to the end of the text. In that way the editing mode is rather like a word processing package which allows swift movement over a piece of text for correction purposes.

One factor which has importance is the memory space available for utilising Logo features. Logo sits between the addresses 24832 and 65024, its workspace comprising 2293 nodes each of 5 bytes. The command NODES will return the number of free nodes in the workspace. A simple SQUARE procedure — TO SQUARE, REPEAT 4 [FD 30 RT 90], END, requires 120 nodes, which means the workspace can cope with a large number of squares. Any procedures can be SAVEd, for later use and development, to either cassette or microdrive.

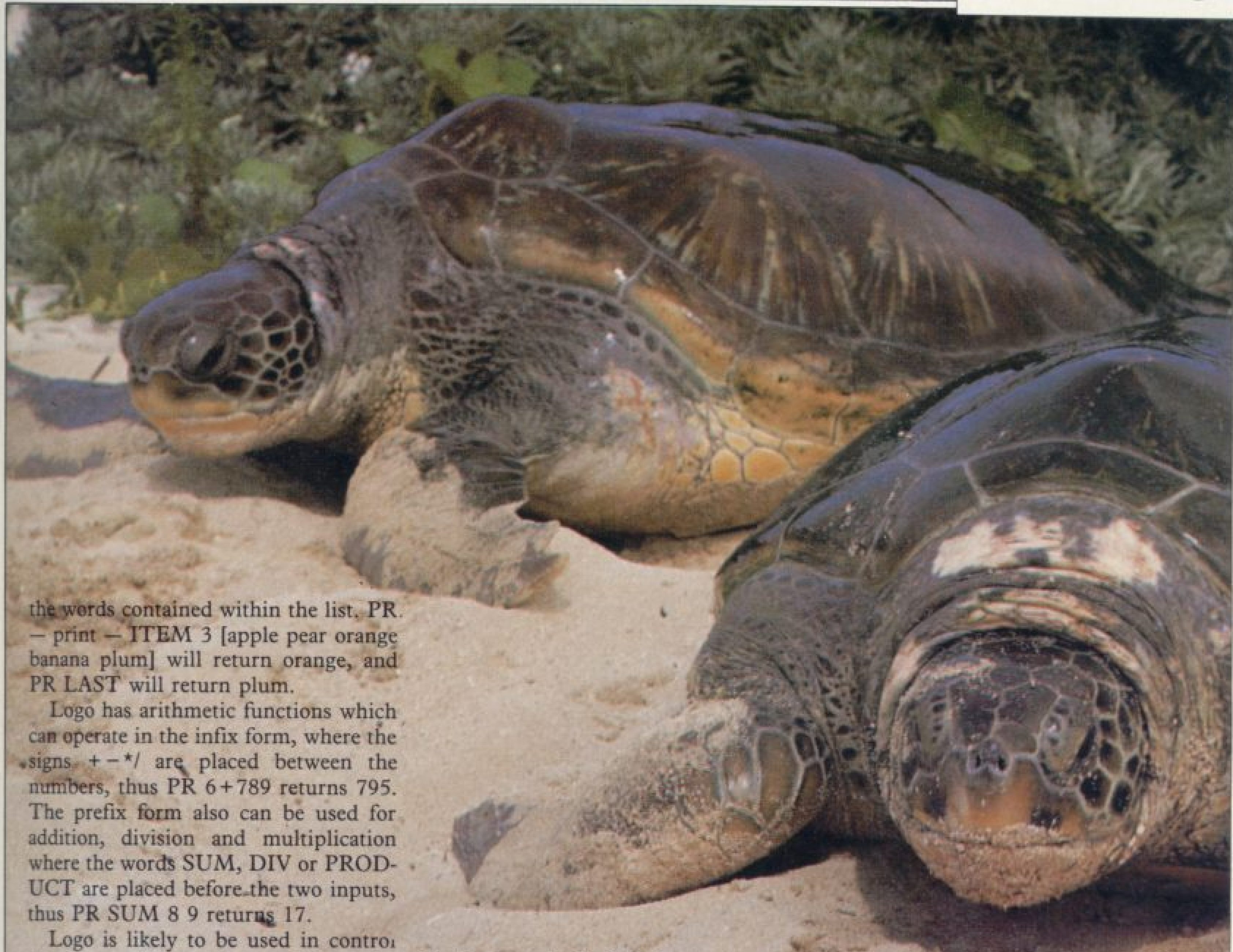
Just as the editing mode is relatively simple, so the error messages are easy to understand. 'I don't know how to . . ." will appear as an error message if the user ENTERs a named procedure in Logo mode which has not been defined, and other error messages include 'Not enough inputs to . . .' and 'Turtle out of field'.

Logo is a high-level computer language in that its commands are near to language as it is spoken in a shortened form. A list of some of the words used will show how simple the actual vocabulary of Logo is: SETPC — set pen colour followed by a Spectrum colour number; PD — pen down; ST — show turtle. The similarity to spoken language is the main appeal of Logo, as it makes the language more accessible.

That is not, however, the whole story because although the vocabulary is easy the grammar is difficult. It is necessary to observe certain rules in the use of the vocabulary, spaces have to be put in the appropriate places and square brackets have to be used in some circumstances. That means that there still is some learning to be done and attention must be paid to the correct entry of commands; it is no good typing BK30 as the error message will appear: 'I don't know how to BK30'. There must be a space between BK and 30.

With graphics Logo does, on the whole, satisfy the criteria stipulated by Papert; it is a tool by which you can explore the world of geometry and learn by doing rather than by being told. It provides an entrance into the world of computer programming and inculcates good programming practice.

It is a mistake, however, to think of Logo as merely a learning tool for geometry. Sinclair Logo is the full implementation of the language, providing powerful list processing facilities. A list can be a group of words, other lists or both; for example [apple pear orange banana plum] is a list and a number of commands can be used to manipulate



the words contained within the list. PR — print — ITEM 3 [apple pear orange banana plum] will return orange, and PR LAST will return plum.

Logo has arithmetic functions which can operate in the infix form, where the signs +−*/ are placed between the numbers, thus PR 6+789 returns 795. The prefix form also can be used for addition, division and multiplication where the words SUM, DIV or PRODUCT are placed before the two inputs, thus PR SUM 8 9 returns 17.

Logo is likely to be used in control situations without using machine code. Not only can a robotic device be controlled via the commands STARTROBOT and STOPROBOT, which causes the commands FD, BK and so on, to be executed by the device, but there is also the facility to monitor inputs and outputs. SERIALIN will read everything that arrives at the serial port and SERIALOUT will send a byte to the serial port — RS232 interface.

Logo 2, the programmer's reference guide, is precisely what its title implies and it would seem that there will be a whole industry of new books based on interpreting and explaining the concepts contained in it. That would be a pity as, ideally, the Logo world should be explored without a phrase book; it is the process of discovery which is important rather than the end product.

Chapter Seven, Conditional expressions and flow of control, illustrates the nature of the manual. Anyone who has learned some Basic has probably learned the IF command: IF a=5 THEN GOTO. The similar command in Logo is explained in the manual in the following way: IF pred instructionlist1 instructionlist2. It is necessary to enclose the instruction lists in square brackets. That illustrates that it is misleading to think of Logo as always being more simple than Basic.

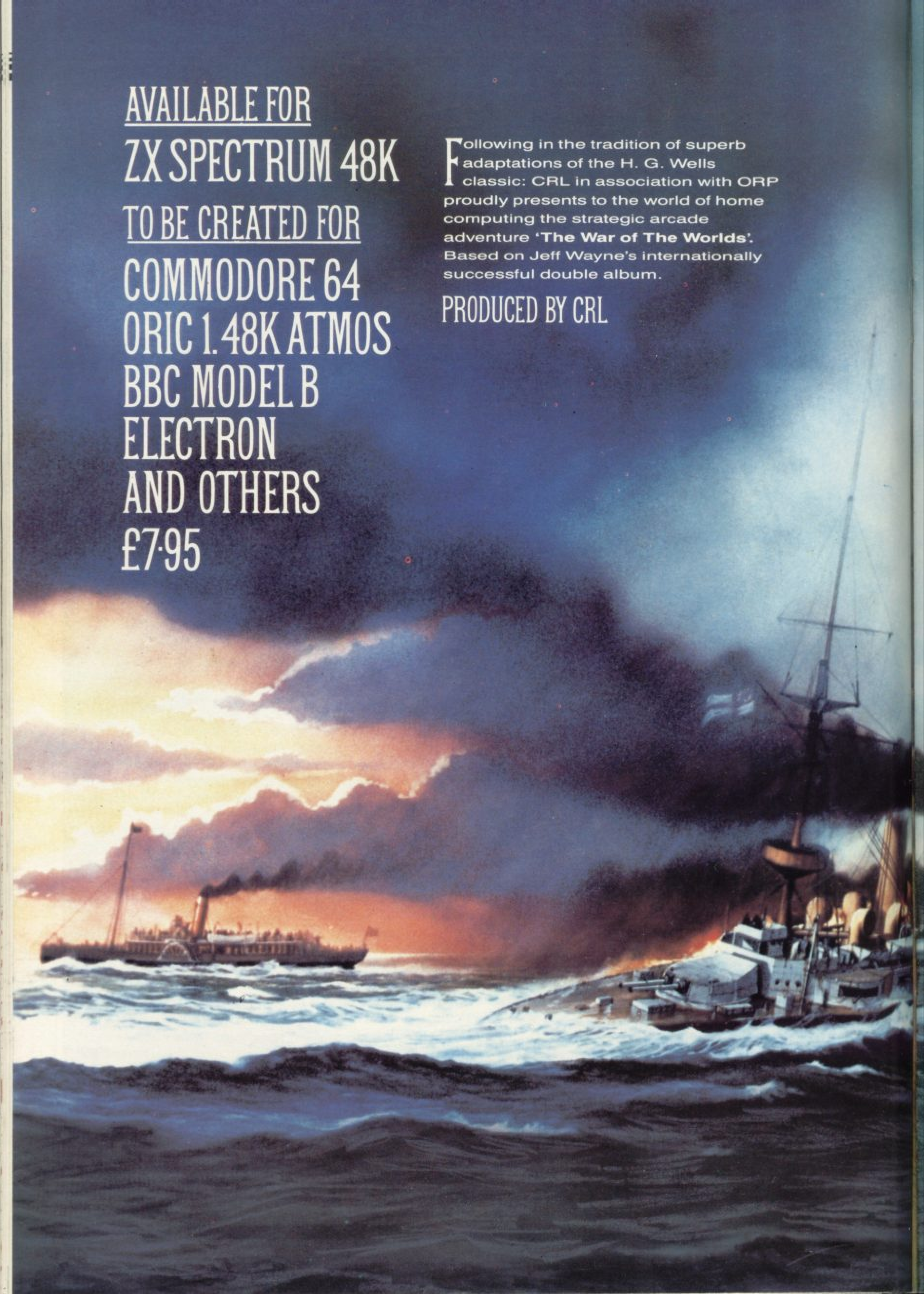
One notable feature missing from this version of Logo is the absence of the SPRITE function which both the Atari and the forthcoming BBC version have. That allows the user to piggyback a graphic onto a sprite and then set the speed. As well as having colour and sound the dimension of movement can be easily added, obviously an extra, exciting attraction. Clever programmers will probably use the facility to LOAD a machine code routine into the Logo workspace to overcome that lack but it makes the process more complicated. There is no blockfill command either.

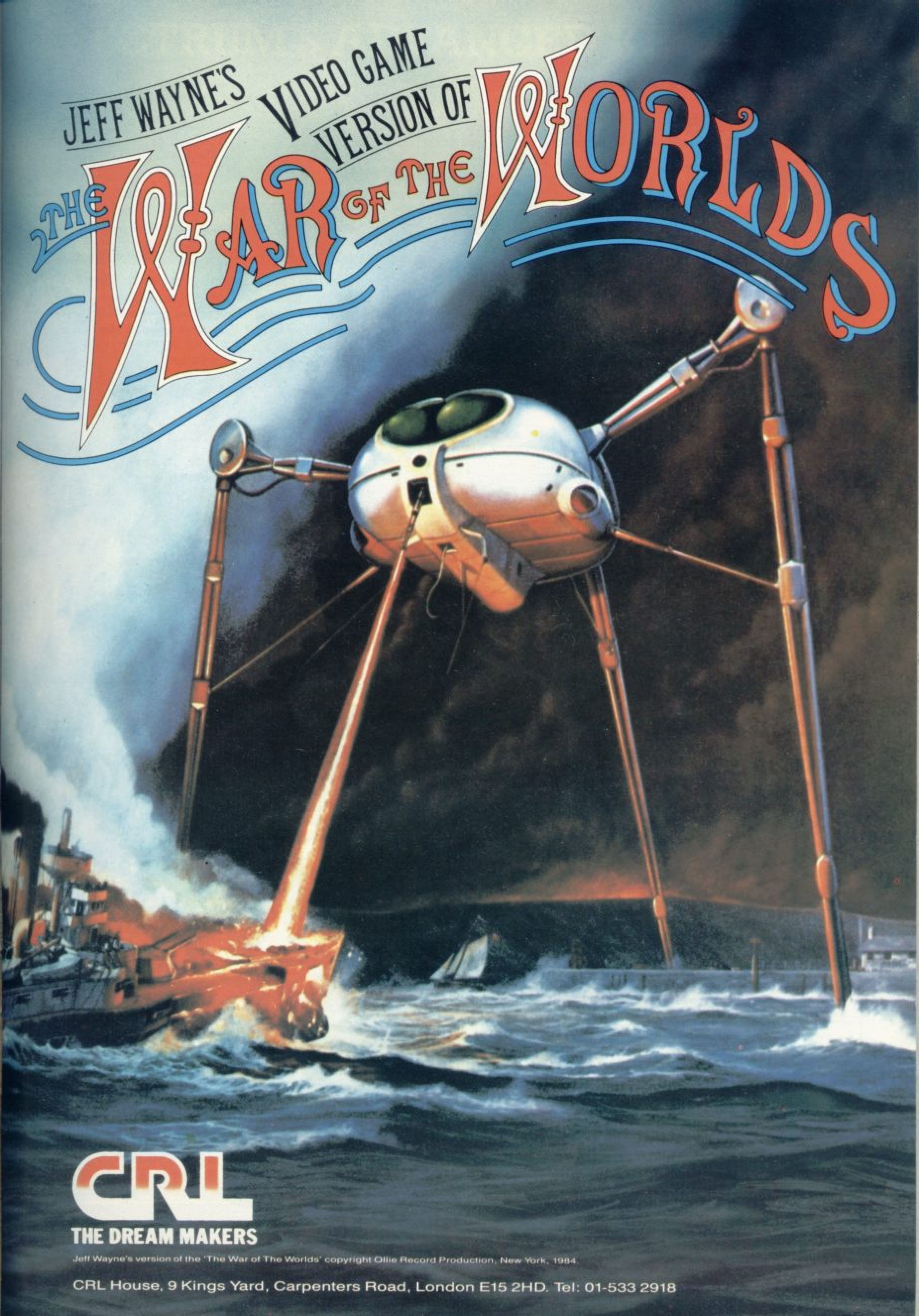
Overall, Logo is the package which could become the programming language used throughout the school system and, when the examination boards recognise its use, there will be the extra motivation to buy it. Added to that is the fact that control packages are being developed by the Microelectronics Education Programme and the Open University which indicates that, as well as being the means by which users can explore geometric and mathematical concepts in an interactive way, they will also be able to control and manipulate electronic devices.

The package costs £39.95 and consequently there is likely to be some price sensitivity to Logo in the home market, especially when considering the bottom line value of the medium — the cassette — on which it is produced.

Logo fully illustrates Papert's insistence that the emphasis should be on user control: forget about zapping answers in response to sums, control what is happening on the screen and at the end of the cable instead. Problem-solving becomes more interesting when the results can be seen immediately and are more spectacular, without the need for complicated Basic commands. Above all, once learned, Logo is a gateway to the complex world of mathematics and computer control.

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For beginners and experts alike. Designed to give above average players a good run for their money and to give beginners an excellent introduction without the worry of an impatient partner.

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A music synthesiser program designed to compose 3-part harmonies when used with the Zon, Fuller and Timedata sound boxes or any other using the AY-3-8912 chip where the 'OUT' command is known. 'Brilliant' – ZX Computing.



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All the fun of the fair, plus unimaginable terrors in the House of Horror and the Ghost Train before you can find the five items of treasure hidden somewhere in the Fairground.

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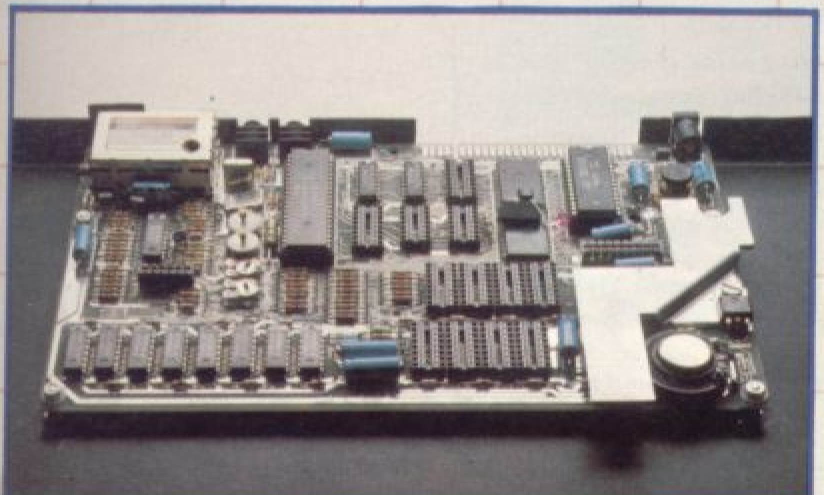


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DOOMDARK'S

Sinclair User and *Beyond Software* challenge you to unravel the ancient mystery of Elt-Mar's quest

STUDY THE parchment map of Icemark, then read the account below of a traveller in those lands, a barbarian lord called Elt-Mar. One fact missing from the tale is Elt-Mar's starting-point. See if you can discover where he began his journey.

The first prize will be a copy of the new adventure from Beyond, **Doomdark's Revenge,** and the framed painting of the map of Icemark.

Just send us a postcard giving the name of the place where Elt-Mar began his quest, together with your name, address and telephone number. Address your entry to: Doomdark Competition, *Sinclair User,* EMAP Publications, 67 Clerkenwell Road, London EC1R 5BH, to arrive not later than October 19. The first out of the bag will win the game and the picture.

The 25 runners-up will also receive copies of Doomdark's Revenge. The next 25 will receive copies of the Beyond pyramid game, **Spellbound.** In fact, everyone's a winner because Beyond will give every entrant a discount voucher allowing money off a Beyond product.

ON THE FIRST day we headed east and travelled through a bleak landscape devoid of trees or any landmark.

Our dwarf guide Hammertooth then turned northeast and a second day passed without event save for Selorn's mount throwing a shoe.

Hammertooth was taciturn about what dangers we skirted but heading north on the third day we gained some hint. A small caravan was spotted moving east across our path — indeed we had noted a fire to our west that previous evening.

Now Dolineon hailed them from a small hillock while we readied ourselves for hostilities, as the standard which flew from the lead horse was not dwarfish in design.

They responded to our hail but were truly a sorry sight. A party of 12 led by Malidril the Fey and the remnants of a mighty force. He had set out from the Fey township of Lorangrim far to the south with 1,100 goodly and brave Fey warriors to seek the Lost Spear of Tarashorn. Maladril said that barely had they reached the mountains before they were set upon by raiders from the Frozen Empire.

Valient resistance crumbled against Shareth's troops and Malidril lost all save four score men. He resolved to return home and had been travelling south east across the plains for five days. During that time his force had been reduced to the bare 12 we saw before us by a great dragon flying south which attacked them with much lashings of tail and fiery breath. We left them with the extra provisions they needed as their trail turned south.

Two days further north and we spent a night betwixt two great settlements. One was due west of us, the other slightly to the north and east. We believed them friendly but the dwarfs reminded me that these were troubled times.

Icy mountains now reared above us and Hammertooth turned us slightly to the north east, skirting one of the settlements, to where he knew a path.

That night two wolves, obviously desperate for food, beseiged us at our camp fire. Selorn alone acted swiftly, smiting one wolf a mighty stroke across its side and driving both off, but not before one of our horses slipped its halter and escaped into the night.

As we approached the pass, the ground trembled and a giant man some 15 Kolons in height reared up. He was many leagues from his homeland but was quick to gain our friendship by offering to share three mountain goats which had fallen into a trap he had dug. He told us what we had learnt already from Maladril, that Shareth's Raiders were despoiling the countryside around Glormane.

He also advised Hammertooth on a gateway to an underground passage which we knew was hereabouts.

Hammertooth it was who found the gate when again we turned north. For my part I would rather our path had not led into that dank tunnel but my dwarfish companions thrust onwards in high spirits.

We travelled on only the gods know how long. Three days certain but I suspect that even the dwarfs lost track of time. I do know that we travelled ever northwest for Old Bendrak did prove it with dwarfish tricks and undereath reasonings. At one point it was clear that we passed beneath a large settlement.

Many paths led away from our tunnel but never did we stray from the route. When the pinpoint of light appeared at the far end of the tunnel I had given up hope of ever seeing ought save gloom again.

The tunnel opened at another gateway among downs. Glireon lay before us and my heart leapt at the thought of the treasure that awaited us there.



S REVENGE

EVERYONE A WINNER!



The Lords of Midnight was the first of a trilogy of epic games. The next in the series, **Doomdark's Revenge,** will be available on the Spectrum at the end of October 1984. This game will also feature landscaping and a host of new features.

Author Mike Singleton, has honed his programming techniques to give Doomdark's Revenge a much larger adventure world. Players will be able to bribe or bargain with non-allied characters and both enemy and neutral forces will move of their own accord during the adventure.

Doomdark, the evil witchking, may have been slain at the end of the first saga, but his spirit lives on. Revenge lies in the hands of Doomdark's daughter, Shareth the Heartstealer, Empress of the Icemark. By vile sorcery she kidnaps Morkin, son of Luxor the Moonprince, and vanishes into the snowy wastes of her savage domain.

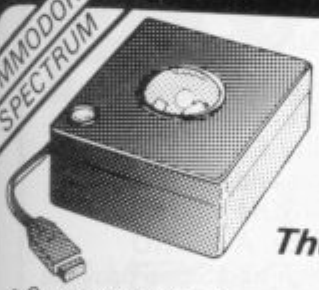
You command the heroes of The Lords of Midnight — Luxor, Corleth the Fey and Rothron the Wise. You will also have the aid of Tarithel the Dreamer, Morkin's lover. Your task, to locate Shareth and rescue Morkin.

The Icemark is a forbidding wasteland, half as big again as the lands of Midnight. That means that it contains six thousand different locations as opposed to the four thousand in Lords of Midnight. If you were to visit all of them you could notch up an incredible forty-eight thousand views. And that is above ground, for you can also take your party down into the dwarfen mines.

Beyond have also produced the first of a range of play aids. This is the Icemark Campaign Chart, a large map/poster of Icemark. The chart has a special wipe-down surface which enables players to plot the position of their characters and Shareth's minions.

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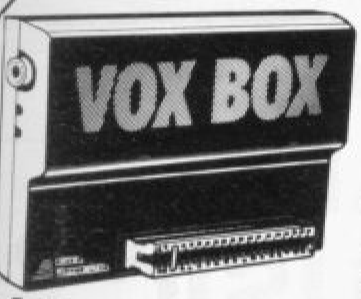
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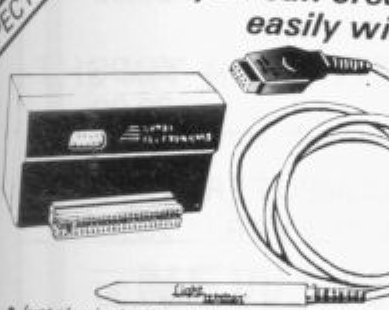
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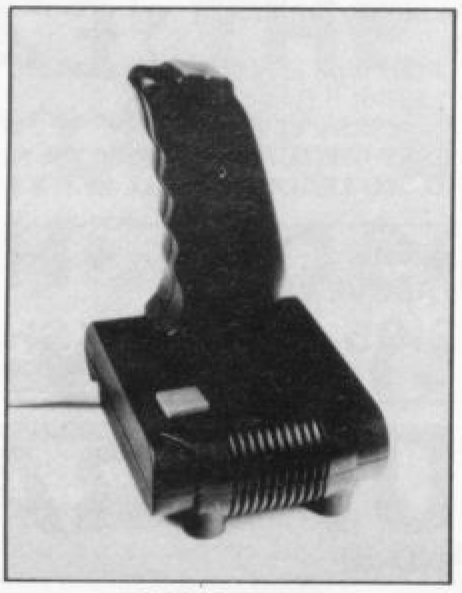
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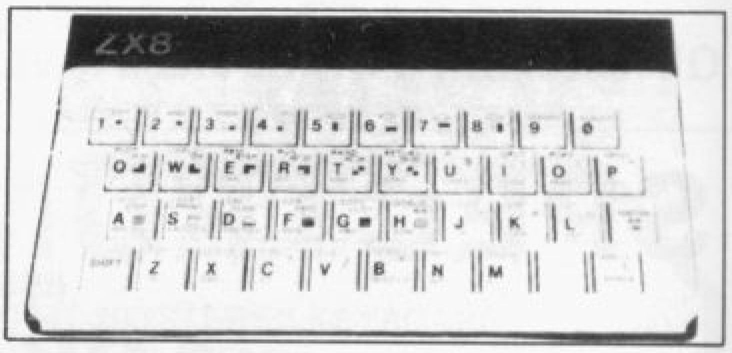
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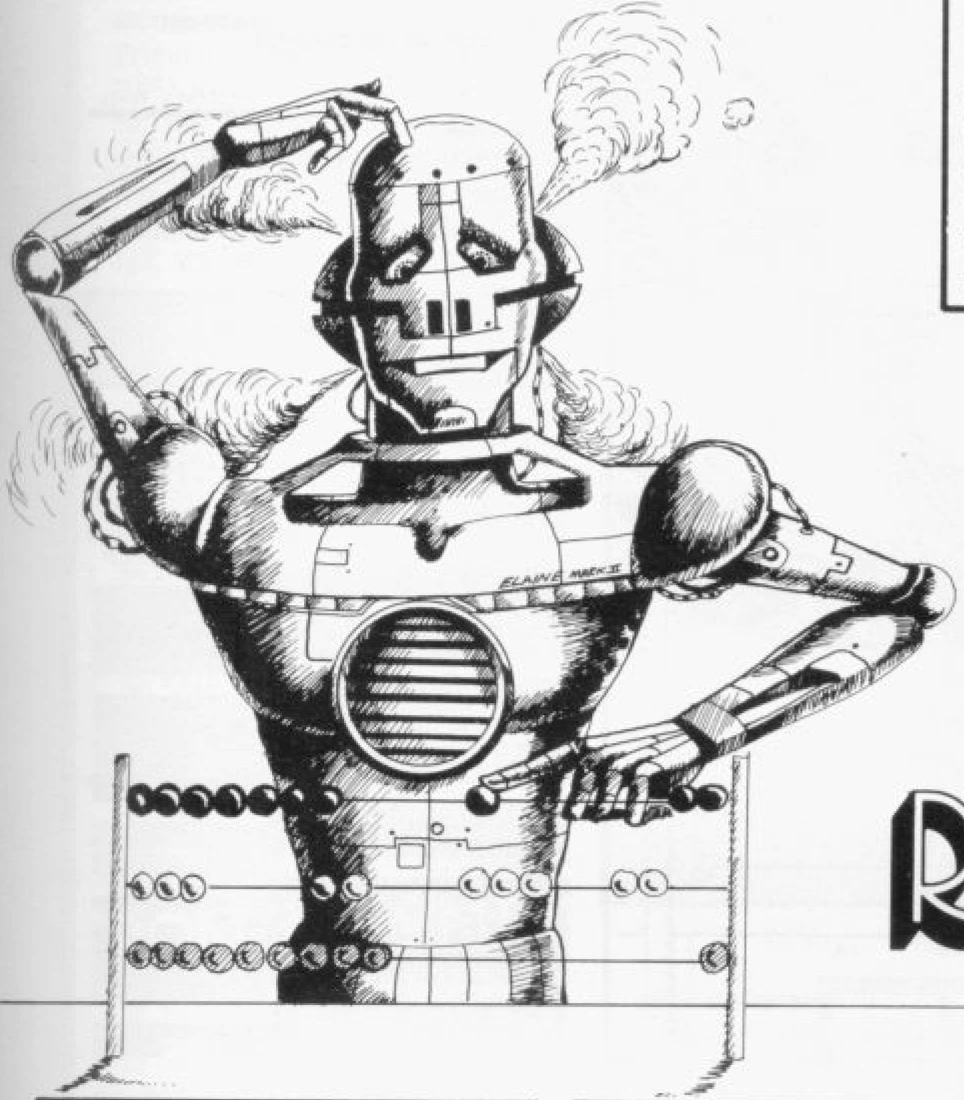
Instructions for graphics characters are printed in lower-case letters in our listings. They are enclosed by brackets and separated by colons to distinguish them and the brackets and colons should not be entered.

Inverse characters are represented by the letter "i" and graphics characters by "g". Thus an inverse W would be represented by "iw", a graphics W by "gw", and an inverse graphics W by "igw".

Spaces are represented by "sp" and inverse spaces by "isp". Whenever any character is to be used more than once, the number of times it is to be used is shown before it, together with a multiplication sign. Thus "6*isp" means six inverse spaces and "(g4:4*i4:g3)" would be entered as a graphic four, followed by an inverse four repeated four times, followed by a graphics three.

Where whole words are to be written in inverse letters they appear in the listings as lower-case letters. Letters to be entered in graphics mode on the Spectrum are underlined.

Inverse characters may be entered on the ZX-81 by changing to graphics mode and then typing the appropriate characters and on the Spectrum by changing to inverse video and typing the appropriate letters. Graphics characters may be entered on the ZX-81 by changing to graphics mode and then pressing symbol shift while the appropriate characters are entered. On the Spectrum graphics characters may be obtained by changing to graphics mode and then pressing the appropriate character. User-defined graphics will appear as normal letters until the program has been RUN.

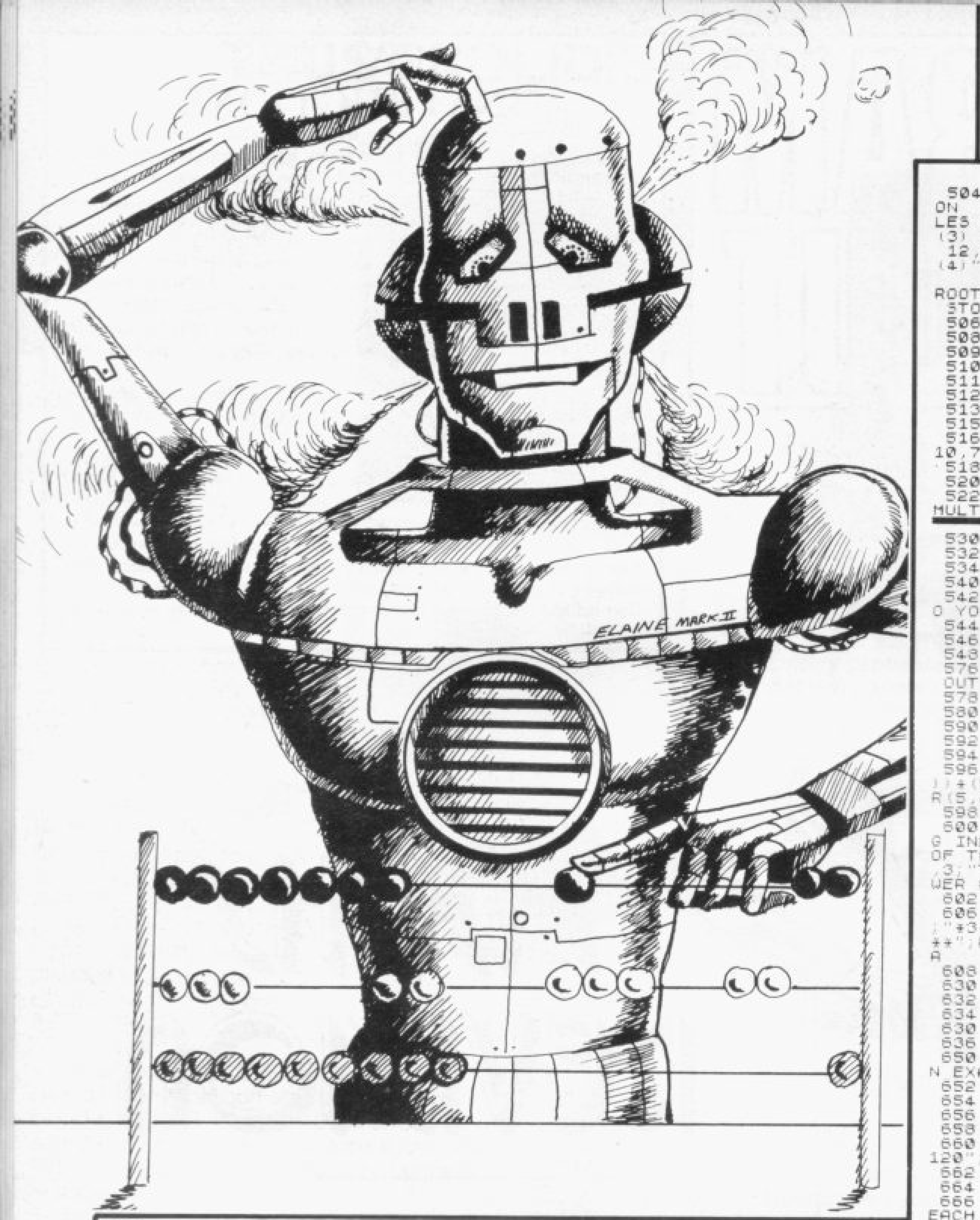


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```
  8 GOTO 12
 10 SAVE "F[illegible]"
 12 GOSUB 520
 14 DIM R(5,2)
 16 GOTO 500
 20 REM  INFORMATION
 22 CLS
 24 PRINT AT 2,0;"factor";AT 4,
5;"- IS A NUMBER WHICH WILL","GO
 EXACTLY INTO ANOTHER NUMBER.";A
T 6,0;"multiple";AT 7,5;"- IS A
NUMBER FORMED BY","MULTIPLYING O
THER NUMBERS.";AT 9,0;"prime num
ber";AT 10,5;"- HAS ONE AND ITSE
LF AS","FACTORS.";AT 12,0;"prime
 factor";AT 13,5;"- IS A FACTOR
WHICH IS A","PRIME NUMBER.";AT 1
5,0;"index";AT 16,5;"- TELLS YOU
 HOW MANY TIMES","A NUMBER IS MU
LTIPLIED","BY ITSELF."
 26 GOSUB 530
 28 CLS
 30 PRINT AT 2,0;"5 TO THE POWE
R 2,(5X5)","IS 5 SQUARED.";AT 4,
0;"5 TO THE POWER 3,(5X5X5)","IS
 5 CUBED";AT 6,0;"square root";A
T 7,5;"- IS A NUMBER WHOSE SQUAR
E","IS EQUAL TO THE GIVEN NUMBER
.";AT 9,0;"highest common factor
";AT 10,5;"- OF TWO OR MORE NUMB
ERS","IS THE GREATEST NUMBER WHI
CH","IS A FACTOR OF EACH OF THEM
.";AT 13,0;"lowest common multip
le";AT 14,5;"- IS THE LEAST NUMB
ER WHICH","IS A MULTIPLE OF EACH
 OF THEM."
 32 GOSUB 530
 34 GOTO 500
 40 REM  TABLES TEST
 42 CLS
 44 PRINT "TABLES TEST";AT 1,0;
"(isp)"
 46 LET S=0
 48 GOSUB 540
 50 FOR C=1 TO N
 52 LET F=INT (RND*12)+1
 54 LET H=INT (RND*12)+1
 56 PRINT AT 8,0;C;AT 8,5;F;AT
8,8;"X";AT 8,11;H;AT 8,14;" = "
 58 LET A=F*H
 60 GOSUB 630
 62 PRINT AT 8,19;G$
 64 PRINT AT 9,13;"ANS = ";A
 66 IF VAL G$=A THEN LET S=S+1
 68 SCROLL
 70 SCROLL
 72 NEXT C
 74 GOSUB 576
 76 GOTO 500
 80 REM  LONG DIVISION
 82 CLS
 84 PRINT "LONG DIVISION";AT 1,
0;"(isp)"
 86 LET S=0
 88 GOSUB 540
 90 FOR C=1 TO N
 92 LET P=INT (RND*100)+1
 94 LET Q=INT (RND*100)+1
 96 LET A=P*Q
 98 PRINT AT 8,0;C;AT 8,5;A;"/
";Q;" = "
100 INPUT G$
102 LET P$=STR$ P
104 IF LEN G$<>LEN P$ THEN GOTO
100
106 PRINT AT 8,19;G$;AT 9,13;"A
NS = ";P
108 IF VAL G$=P THEN LET S=S+1
110 SCROLL
112 SCROLL
114 NEXT C
116 GOSUB 576
118 GOTO 500
120 REM  MULTIPLICATION
122 CLS
124 PRINT "MULTIPLICATION";AT 1
,0;"(isp)"
126 LET S=0
128 GOSUB 540
130 FOR C=1 TO N
132 LET P=INT (RND*100)+1
134 LET Q=INT (RND*100)+1
136 LET A=P*Q
138 PRINT AT 8,0;C;AT 8,5;P;" X
";Q;" = "
140 GOSUB 630
```

continued on page 80



continued from page 79

```
 142 PRINT AT 8,19;G$;AT 9,13;"A
NS = ";A
 144 IF VAL G$=A THEN LET S=S+1
 146 SCROLL
 148 SCROLL
 150 NEXT C
 152 GOSUB 576
 154 GOTO 500
 170 REM HCF AND LCM
 172 CLS
 174 LET L$="HCF AND LCM"
 176 PRINT L$;AT 1,0;"[redacted]"
 178 GOSUB 650
 179 CLS
 180 GOSUB 600
 181 GOSUB 540
 182 LET S=0
 184 FOR C=1 TO N
 186 LET J=1
 188 GOSUB 590
 190 LET K=A
 192 LET J=2
 194 GOSUB 590
 196 LET M=A
 198 PRINT AT 8,0;C;AT 8,5;K;AT
9,5;M;AT 9,17;"HCF ="
 200 INPUT G$
 202 PRINT G$;" = ";VAL G$
 204 FOR D=1 TO 5
 206 IF R(D,1)<=R(D,2) THEN GOTO
 210
 208 GOTO 216
 210 LET W=R(D,1)
 212 LET R(D,1)=R(D,2)
 214 LET R(D,2)=W
 216 NEXT D
 218 LET J=2
 220 GOSUB 596
 222 GOSUB 606
 223 LET A$=STR$ A
 224 IF VAL G$=VAL A$ THEN LET S
=S+1
 226 PRINT TAB 17;"LCM ="
 228 INPUT G$
 230 PRINT G$;" = ";VAL G$
 232 LET J=1
 234 GOSUB 596
 236 GOSUB 606
 237 LET A$=STR$ A
 238 IF VAL G$=VAL A$ THEN LET S
=S+1
 240 GOSUB 530
 242 CLS
 244 NEXT C
 246 PRINT AT 19,4;"SCORE:";AT 1
9,14;S;" OUT OF ";N+N
 247 GOSUB 530
 248 GOTO 500
 250 REM  SQUARE ROOTS
 252 CLS
 254 LET L$="SQUARE ROOT"
 256 PRINT L$;AT 1,0;"[redacted]"
 257 GOSUB 680
 258 CLS
 259 GOSUB 600
 260 GOSUB 540
 261 LET S=0
 262 FOR C=1 TO N
 264 LET J=1
 266 GOSUB 590
 268 LET K=A*A
 270 PRINT AT 8,0;C;AT 8,5;K;AT
8,15;L$;" = "
 272 INPUT G$
 274 PRINT G$;" = ";VAL G$
 276 GOSUB 606
 277 LET A$=STR$ A
 278 IF VAL G$=VAL A$ THEN LET S
=S+1
 280 FOR D=1 TO 5
 282 SCROLL
 284 NEXT D
 286 NEXT C
 288 GOSUB 576
 290 GOTO 500
 499 STOP
 500 CLS
 502 PRINT AT 2,13;"MENU";AT 3,1
3;"[redacted]";AT 20,5;"SELECT CHOICE"
 504 PRINT AT 6,2;"(1) INFORMATI
ON      ...(1)";AT 8,2;"(2) TAB
LES TEST       ...(2)";AT 10,2;"
(3) LONG DIVISION      ...(3)";AT
 12,2;"(4) MULTIPLICATION     ...
(4)";AT 14,2;"(5) HCF AND LCM
    ...(5)";AT 16,2;"(6) SQUARE
ROOTS        ...(6)";AT 18,2;"(7)
 STOP               ...(7)"
 506 IF INKEY$="" THEN GOTO 506
 508 IF INKEY$="1" THEN GOTO 20
 509 IF INKEY$="2" THEN GOTO 40
 510 IF INKEY$="3" THEN GOTO 80
 511 IF INKEY$="4" THEN GOTO 120
 512 IF INKEY$="5" THEN GOTO 170
 513 IF INKEY$="6" THEN GOTO 250
 515 CLS
 516 PRINT AT 9,11;"[redacted]";AT
10,7;"[redacted]"
 518 STOP
 520 CLS
 522 PRINT AT 10,4;"FACTORS AND
MULTIPLES";AT 11,4;"[redacted]"
 530 PRINT AT 21,5;"PRESS C"
 532 IF INKEY$="" THEN GOTO 532
 534 RETURN
 540 PRINT
 542 PRINT "HOW MANY QUESTIONS D
O YOU","WISH TO ANSWER?"
 544 INPUT N
 546 CLS
 548 RETURN
 576 PRINT AT 19,4;"SCORE: ";S;"
OUT OF ";N
 578 GOSUB 530
 580 RETURN
 590 FOR T=1 TO 5
 592 LET R(T,J)=INT (RND*3)
 594 NEXT T
 596 LET A=(2**R(1,J))*(3**R(2,J
))*(5**R(3,J))*(7**R(4,J))*(11**
R(5,J))
 598 RETURN
 600 PRINT AT 3,5;"EXPRESS, USIN
G INDICES,","THE ";L$;" OF EACH
OF THE","FOLLOWING NUMBERS",AT 7
,3;"THE SYMBOL FOR","""TO THE PO
WER OF"" IS **."
 602 RETURN
 606 PRINT "ANS = ";"2**";R(1,J)
;"*3**";R(2,J);"*5**";R(3,J);"*7
**";R(4,J);"*11**";R(5,J);" = ";
A
 608 RETURN
 630 INPUT G$
 632 LET A$=STR$ A
 634 IF LEN G$<>LEN A$ THEN GOTO
 630
 636 RETURN
 650 PRINT AT 3,0;"DO YOU WANT A
N EXAMPLE? (Y/N)"
 652 IF INKEY$="" THEN GOTO 652
 654 IF INKEY$="N" THEN RETURN
 656 CLS
 658 GOSUB 600
 660 PRINT AT 9,5;"12";AT 10,5;"
120";AT 10,17;"HCF ="
 662 GOSUB 530
 664 CLS
 666 PRINT "FIND THE FACTORS OF
EACH NUMBER"
 668 PRINT
 670 PRINT TAB 6;"2/ 12";TAB 19;
"2/120";TAB 6;"2/  6";TAB 19;"2/
60";TAB 6;"3/  3";TAB 19;"2/ 30
";TAB 10;"1";TAB 19;"3/ 15";TAB
19;"5/  5";TAB 23;"1"
 672 PRINT "THE HIGHEST COMMON F
ACTOR IS","OBTAINED BY FINDING T
HE FACTORS","COMMON TO BOTH.","
FOR 12 AND 120 THEY ARE ","2**2
AND 3**1",,"HCF = 2**2 * 3**1"
 674 PRINT "THE LOWEST COMMON MU
LTIPLE IS","OBTAINED BY MULTIPLY
ING THE","HIGHEST VALUE FOR EACH
 FACTOR","IN BOTH NUMBERS.","FOR
 12 AND 120 THEY ARE ","2**3 AND
 3**1 AND 5**1","LCM = 2**3 * 3*
*1 * 5**1"
 676 GOSUB 530
 678 RETURN
 680 PRINT AT 3,0;"DO YOU WANT A
N EXAMPLE? (Y/N)"
 682 IF INKEY$="" THEN GOTO 682
 684 IF INKEY$="N" THEN RETURN
 686 CLS
 688 GOSUB 600
 690 PRINT AT 9,5;"324";AT 9,15;
L$;" = "
 692 GOSUB 530
 694 CLS
 696 PRINT "FIND THE FACTORS OF
THE NUMBER"
 698 PRINT
 700 PRINT TAB 11;"2  324";TAB 1
1;"2/ 162";TAB 11;"3/  81";TAB 1
1;"3/  27";TAB 11;"3/   9";TAB 1
1;"3/   3";TAB 16;"1"
 702 PRINT
 704 PRINT "WRITE THE FACTORS IN
 INDEX FORM"," = 2**2 AND 3**4"
 706 PRINT
 708 PRINT "HALVE THE INDICES AN
D MULTIPLY","THE NUMBERS TOGETHE
R TO GIVE","THE SQUARE ROOT","",
" = 2**1 * 3**2"
 710 GOSUB 530
 712 RETURN
```

ESCAPE FROM COSMITRON



THE MARTIAN emperor Zong has thrown you into prison. Martian prisons make South American jails look like five-star hotels, so you had better escape. You must dodge or jump over the guards to collect four pieces of the teleport key while making your way to freedom.

Full instructions are given in the program, which uses some of our special instructions for graphics found on the first page of Program Printout. You can leave out lines 20-35 if you do not want to type in all the characters for the title screen. **Escape from Cosmitron** was written by John Hobden of Redhill, Surrey and runs on the 16K ZX-81.

```
  10 CLS
  11 LET X=3
  12 LET Y=1
  13 LET A=3
  14 LET B=28
  15 LET B1=8
  16 LET A1=A
  17 LET G$="■"
  18 LET K=0
  20 PRINT "      ESCAPE"
  23 PRINT "        FROM"
  25 PRINT "******************
***
**********"
  30 PRINT "
RON COSMIT
        BY JOHN HOBDEN"
  35 PRINT "
      PRESS      A
  KEY"
  40 PRINT AT 1,21;"(4+SP)  (3+
SP)";AT 2,21;"(4+SP)  (3+SP)";A
T 3,21;"(4+SP)  (3+SP)"
  45 PRINT AT 4,21;"(4+SP)  (2
+SP)";AT 5,21;"(4+SP)  (2+SP)"
;AT 6,21;"(2+SP)=   (2+SP)";AT
 7,21;"(4+SP)  (2+SP)"
  50 PRINT AT 8,21;"(2+SP)   (
3+SP)";AT 9,21;"(2+SP) (2+SP)  (
3+SP)"
  55 PRINT AT 10,21;"(SP)  (2+SP
)   (SP";AT 11,21;"****(4+SP)
(SP"
  56 IF INKEY$="" THEN GOTO 56
  58 FOR N=1 TO 22
  59 SCROLL
  60 NEXT N
  61 PRINT AT 1,1;"  I N S T R U
 C T I O N S"
  62 PRINT
  63 PRINT "WHILE EXPLORING ON M
ARS YOU      ARE CAUGHT BY THE EV
IL EMPORER   ZONG...
             HE HAS PUT YOU IN CO
SMITRON      PRISON. OF COURSE YO
U DECIDE     TO ESCAPE"
  64 PRINT "BUT THE DAY YOU CHOO
SE TO ESCAPEON IS THE PRISONERS
EXERCISE     DAY. SOME WANT YOU T
O COME TO    TEA. WHAT IS SO BAD
ABOUT THAT   YOU SAY ...YOU HAVEN
""T TASTED"
  65 PRINT "MARTIAN TEA. IT IS D
EADLY. SO    AVOID THE PRISONERS.
"
  67 PRINT
  68 PRINT "               GOOD LUC
K"
  69 PRINT "PRESS A KEY"
  70 IF INKEY$="" THEN GOTO 70
  80 CLS
  85 PRINT AT 3,1;" KEYS...";AT
5,4;" 1...LEFT";AT 7,4;" 2...RIG
HT";AT 9,4;" 3...DESCEND LADDER"
;AT 11,4;" 9...JUMP LEFT";AT 13,
4;" 0...JUMP RIGHT"
  90 PRINT AT 16,0;"EVEN MORE GO
OD LUCK"
  91 PRINT AT 19,0;"PRESS A KEY
FOR THE GAME"
  92 IF INKEY$="" THEN GOTO 92
  93 CLS
 100 PRINT "*****ESCAPE FROM CO
SMITRON*****(30+SP)"
 101 PRINT " (30+SP)  (29+SP)+
   FIRST FLOOR - CELLS      H
(28+SP)H(SP)"
 102 PRINT " +(29+SP)   H THE R
EVENGE OF FROGGY      (2+SP)H(2
7+SP)"
 103 PRINT " (29+SP)+     ATTAC
K OF THE + SIGNS    H   (28+SP)H(
SP)  +(29+SP)  DON'T FORGET H
THE KEY..."
 104 PRINT " (14+SP)H(15+SP)  (3
0+SP)  H     DANGER AREA
  H  (SP)H(26+SP)H(SP)"
 105 PRINT " (30+SP)
              (SP) (2+SP
) (2+SP) (2+SP)   (2+SP)   (2+
SP) (2+SP) (2+SP) (SP)
 *TELEPORT*"
 120 IF X=3 AND Y=30 OR X=9 AND
Y=30 OR X=6 AND Y=1 OR X=12 AND
Y=1 THEN LET K=K+1
 125 PRINT AT X,Y;"(SP)"
 130 PRINT AT A,B;"(SP)"
 131 PRINT AT A1,B1;"(SP)"
 132 PRINT AT 6,29;"H";AT 9,3;"H
";AT 12,29;"H";AT 15,15;"H";AT 1
8,2;"H";AT 18,29;"H"
 135 LET B=B+(B<Y AND B<30)-(B>Y
 AND B>1)
 136 LET B1=B1+(B1<Y AND B1<30)-
(B1>Y AND B1>1)
 140 LET Y=Y+(INKEY$="2" AND Y<3
0)-(INKEY$="1" AND Y>1)
 145 IF INKEY$="0" THEN GOTO 600
 146 IF INKEY$="9" THEN GOTO 615
 150 IF INKEY$="3" THEN GOTO 300
 165 IF A=X AND B=Y OR A1=X AND
B1=Y THEN GOTO 450
 180 IF X=18 AND Y=15 AND INKEY$
="3" AND K>=4 OR X=18 AND Y=16 A
ND INKEY$="3" AND K>=4 THEN GOTO
 500
 185 PRINT AT A,B;G$
 186 PRINT AT A1,B1;G$
 190 PRINT AT X,Y;"A"
 200 GOTO 120
 300 IF X=3 AND Y=29 OR X=6 AND
Y=3 OR X=9 AND Y=29 OR X=12 AND
Y=15 OR X=15 AND Y=2 OR X=15 AND
 Y=29 THEN GOTO 305
 301 GOTO 160
 305 FOR C=1 TO 2
 309 LET X=X+1
 310 PRINT AT X,Y;"A"
 311 PRINT AT X,Y;"H"
 312 NEXT C
 313 LET X=X+1
 314 LET B=16
 315 LET A=A+3
 316 LET B1=16
 320 IF X=6 THEN LET G$="O"
 321 IF X=9 THEN LET G$="+"
 322 IF X=12 THEN LET G$="▒"
 323 IF X=15 THEN LET G$="■"
 332 IF X=18 THEN LET G$="?"
 333 IF X=15 THEN LET B=1
 334 IF X=15 THEN LET B1=29
 335 LET A1=A1+3
 340 GOTO 120
 400 REM CAUGHT
 450 PRINT AT X,Y;"■"
 455 PRINT AT 1,0;"  YOU ARE CAU
GHT..PRESS A KEY   "
 460 IF INKEY$="" THEN GOTO 460
 470 GOTO 530
 500 PRINT AT 1,0;"   YOU ESCAPE
D...WOW..        "
 510 PRINT AT 0,0;" (9+SP)PRESS
A  KEY(8+SP) "
 520 IF INKEY$="" THEN GOTO 520
 525 PAUSE 100
 530 CLS
 535 FOR N=1 TO 20
 540 PRINT "    A N O T H E R
 G A M E ?    "
 550 NEXT N
 560 IF INKEY$="Y" THEN RUN
 570 IF INKEY$="N" THEN STOP
 580 GOTO 560
 600 IF Y>28 THEN GOTO 120
 610 LET J=1
 611 GOTO 620
 612 IF Y<3 THEN GOTO 120
 616 LET J=-1
 620 PRINT AT X,Y;"(SP)"
 621 PRINT AT A,B;G$
 625 LET X=X-1
 630 LET Y=Y+J
 635 PRINT AT X,Y;"A"
 640 PRINT AT X,Y;"(SP)"
 645 LET Y=Y+J
 650 PRINT AT X,Y;"A"
 655 PRINT AT X,Y;"(SP)"
 660 LET X=X+1
 665 LET Y=Y+J
 670 PRINT AT X,Y;"A"
 680 GOTO 120
 700 SAVE "ESCAPE"
 710 RUN
```

Beacon Adv



BEACON ADVENTURE for the 48K Spectrum is a text adventure by Owen Lloyd of Birmingham. In it you have to find and light a beacon. On the way you will encounter a number of hazards and problems to be solved in the traditional adventure fashion by entering the appropriate two-word commands.

The program uses a few graphics characters. For an explanation of how to enter these please read the instructions on the first page of Program Printout before typing in the program.

```
   1 LET ca=0
   2 LET found=0
   3 LET i=0
   4 LET op=0
   5 LET wo=1
   6 LET st=1
   7 LET fed=0
   8 LET tr=0
   9 BORDER 0: PAPER 0: CLS : IN
K 7
  10 GO SUB 8000: GO SUB 9000
  20 PRINT : PRINT l$(x,y): GO S
UB 9500
  21 FOR f=1 TO 9: IF a(f)=x AND
 b(f)=y THEN  PRINT "Looking aro
und you see a ";o$(f)
  22 NEXT f
  23 IF x=4 AND y=3 THEN  STOP
  30 INPUT "What next ?";c$
  31 LET c$=c$+" "
  35 IF LEN c$=1 THEN  LET a$=c$
  40 FOR f=1 TO LEN c$: IF c$(f)
=" " THEN  LET a$=c$( TO f-1): L
ET b$=c$(f+1 TO ): LET f=LEN c$
  50 NEXT f
  60 IF a$="n" OR a$="s" OR a$="
e" OR a$="w" THEN  GO TO 900
  70 IF a$="get" OR a$="take" TH
EN  GO SUB 1500
  71 IF a$="i" THEN  GO TO 1600
  72 IF a$="r" THEN  GO TO 20
  73 IF a$="d" THEN  GO TO 5000
  80 IF a$="put" OR a$="drop" TH
EN  GO SUB 2000
  90 IF a$="open" THEN  GO SUB 2
500
 100 IF a$="unlock" THEN  GO SUB
 3000
 110 IF a$="feed" THEN  GO SUB 3
500
 120 IF a$="swim" THEN  GO SUB 3
700
 125 IF a$="quit" THEN  GO TO 96
00
 126 IF a$="save" THEN  GO TO 97
00
 130 IF a$="chop" THEN  GO SUB 6
000
 135 IF a$="make" THEN  GO TO 65
00
 140 IF a$="light" THEN  GO TO 4
300
 150 IF a$="insert" THEN  GO SUB
 4500

 160 PRINT "I don't understand.T
ry again.": GO TO 30
 900 IF x=3 AND y=6 AND wo THEN
 PRINT "You are surrounded by wo
lves    who will not let you mov
e.": GO TO 30
 910 IF x>4 AND x<9 AND y=7 AND
st AND a$="e" THEN  PRINT "There
 is a stream in the way!!": GO T
O 30
 920 IF x=8 AND y=3 AND NOT fed
AND a$="w" THEN  PRINT "There is
 a dog in the way !!": GO TO 30
1000 IF a$="w" AND l$(x,y-1,1)="
(ig8)" THEN  PRINT "You can't go
 that way!": GO TO 30
1010 IF a$="n" AND l$(x-1,y,1)="
(ig8)" THEN  PRINT "You can't go
 that way!": GO TO 30
1020 IF a$="s" AND l$(x+1,y,1)="
(ig8)" THEN  PRINT "You can't go
 that way!": GO TO 30
1030 IF a$="e" AND l$(x,y+1,1)="
(ig8)" THEN  PRINT "You can't go
 that way!": GO TO 30
1040 IF a$="s" THEN  LET x=x+1
1050 IF a$="n" THEN  LET x=x-1
1060 IF a$="w" THEN  LET y=y-1
1065 IF a$="e" THEN  LET y=y+1
1070 GO TO 20
1500 IF b$="" THEN  PRINT "Get w
hat?": GO TO 30
1501 LET g=LEN b$
1520 FOR f=1 TO 9: IF x=a(f) AND
 y=b(f) AND b$=o$(f, TO g) THEN
 LET ca=ca+1: LET a(f)=0: LET b(
f)=0: PRINT "O.K.": GO TO 30
1530 NEXT f
1540 PRINT "I can't see a ";b$
1550 GO TO 30
1600 PRINT "You have:": FOR f=1
TO 9: IF a(f)=0 THEN  LET found=
1: PRINT 'o$(f)
1610 NEXT f
1620 IF NOT found THEN  PRINT '"
Nothing!"
1630 LET found=0: GO TO 30

2000 LET kl=0: IF b$="" THEN  PR
INT a$;" what?": GO TO 30
2010 LET g=LEN b$
2015 IF NOT a(3) AND x=3 AND y=6
 AND b$="onion " THEN  LET wo=0:
 PRINT "The wolves run away beca
use of the smell of the onion"
2020 FOR f=1 TO 9: IF b$=o$(f, T
O g) AND NOT a(f) THEN  LET a(f)
=x: LET b(f)=y: LET i=i-1: PRINT
 "O.K..": LET kl=1: IF NOT a(3)
AND x=3 AND y=6 AND b$="onion" A
ND wo THEN  PRINT "The wolves ru
n away because of the smell of t
he      onion.": LET wo=0
2021 IF kl THEN  GO TO 30
2030 NEXT f
2040 PRINT "You don't have a ";b
$: GO TO 30
2500 IF b$="" THEN  PRINT "Open
what?": GO TO 30
2510 IF b$="door " AND x<>6 OR y
<>8 THEN  PRINT "What door?": GO
 TO 30
2520 IF b$<>"door " THEN  PRINT
```

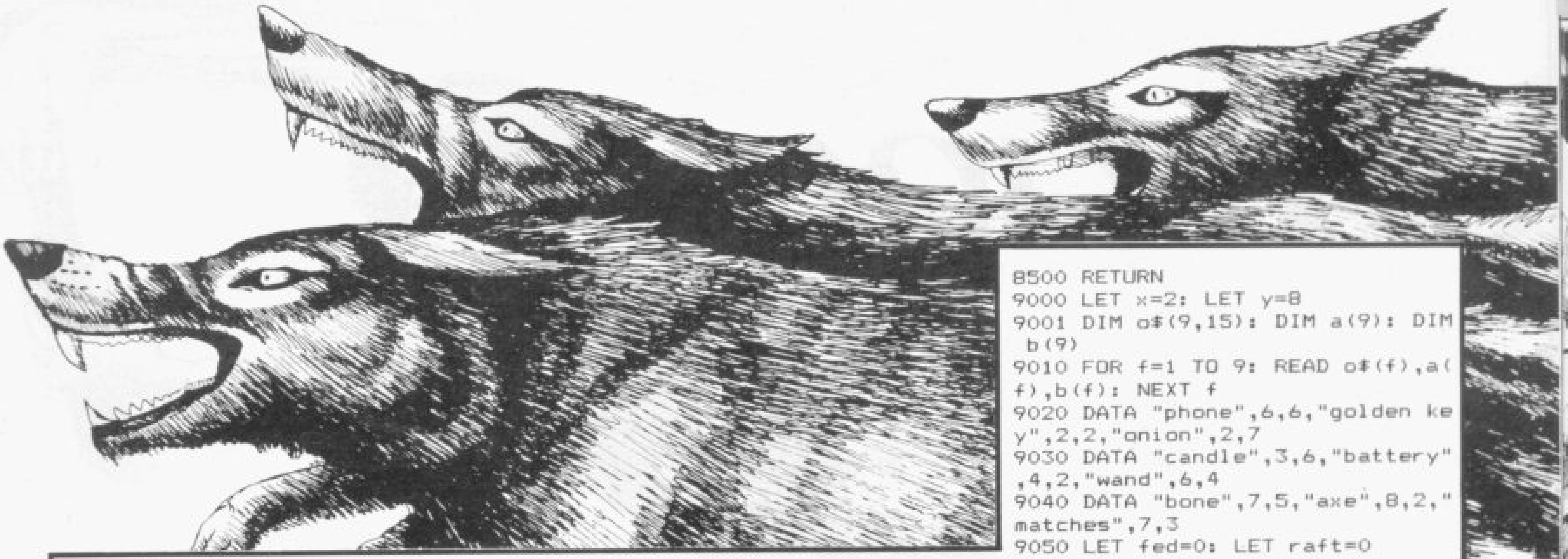
enture



```
"Don't be silly!!": GO TO 30
2530 IF loc THEN  PRINT "It's lo
cked stupid!": GO TO 30
2540 PRINT "O.K..There is a stai
r going down": LET op=1: GO TO 3
0
3000 IF b$="" THEN  PRINT "Unloc
k what?": GO TO 30
3010 IF b$="door " AND x<>6 OR y
<>8 THEN  PRINT "What door?": GO
 TO 30
3020 IF b$<>"door " THEN  PRINT
"Don't be silly!": GO TO 30
3025 IF a(2) THEN  PRINT "What w
ith?": GO TO 30
3030 PRINT "O.K..": LET loc=0: G
O TO 30
3500 IF b$="" THEN  PRINT "feed
what ?": GO TO 30
3510 IF b$<>"dog " THEN  PRINT "
that's silly!!": GO TO 30
3520 IF x<>8 OR y<>3 THEN  PRINT
 "there's no dog here!": GO TO 3
0
3530 IF a(7) THEN  PRINT "I have
 no dog food": GO TO 30
3540  PRINT "Munch,munch!": LET
fed=1: LET a(7)=45: GO TO 30
3700 IF (x<>5 OR y<>5) AND (x<>4
 OR y<>8) AND (x<5 OR y<>7) THEN
  PRINT "There's no water here!"
: GO TO 30
3710 PRINT "Brrr...The water is
too cold!": GO TO 30

4300 IF b$="" THEN  PRINT "light
 what ?": GO TO 30
4305 IF b$<>"candle " THEN  PRIN
T "That's silly!!": GO TO 30
4310 IF a(4) THEN  PRINT "You do
n't have a candle!!": GO TO 30
4320 IF NOT a(4) AND NOT a(9) TH
EN  PRINT "it casts a flickering
 light!!": LET lit=1: GO TO 30
4350 IF a(9) THEN  PRINT "You do
n't have anything to light it wi
th!": GO TO 30
4500 IF b$="" THEN  PRINT "Inser
t what ?": GO TO 30
4505 IF b$<>"battery " THEN  PRI
NT "Don't be nuts!!!": GO TO 30
4510 IF a(5) THEN  PRINT "You do
n't have a battery.": GO TO 30
4520 PRINT "You insert the batte
ry.The        beacon flashes on an
d off.You    have succesfully com
pleted the   adventure.": STOP
5000 IF x=6 AND y=8 AND op AND N
OT a(4) AND lit THEN  LET x=4: L
ET y=8: GO TO 20
5010 IF x=4 AND y=8 AND op AND (
a(4) OR (NOT a(4) AND NOT lit))
THEN  PRINT "IT's too dark!": GO
 TO 30
5011 IF x=6 AND y=8 AND op AND a
(3) THEN  PRINT "IT's too dark!"
: GO TO 30
5020 IF x=4 AND y=8 AND op AND N
OT a(4) AND lit THEN  LET x=6: L
ET y=8: GO TO 20
5050 PRINT "you can't go down":
GO TO 30
6000 IF a(8) THEN  PRINT "you ha
ven't got an axe!!": GO TO 30
6010 IF b$="" THEN  PRINT "Chop
what ?": GO TO 30
6015 IF b$<>"tree " THEN  PRINT
"That's a bit silly": GO TO 30
6020 IF x<5 OR y<>7 THEN' PRINT
"There are no trees worth choppi
ng!": GO TO 30
6030 PRINT "whooshhh....
                The tree falls!": LE
T tr=1: GO TO 30
6500 IF b$<>"raft " THEN  PRINT
"Don't be silly!": GO TO 30
6510 IF b$="" THEN  PRINT "make
what ?": GO TO 30
6520 IF NOT tr THEN  PRINT "You
haven't got any wood": GO TO 30
6530 IF x<5 OR y<>7 THEN  PRINT
"What do you want a raft for ?":
 GO TO 30
6540 PRINT "O.K.you have a raft.
": LET st=0: GO TO 30
7000 IF b$="" THEN  PRINT "Use w
hat ?": GO TO 30
7010 IF b$<>"wand " OR b$<>"phon
e " THEN  PRINT "That's stupid!!
": GO TO 30
8000 DIM l$(9,9,110)
8001 FOR f=1 TO 9: LET l$(1,f)="
(ig8)": NEXT f
8002 FOR f=1 TO 8: LET l$(f,1)="
(ig8)": LET l$(f,9)="(ig8)": LET
 l$(9,f)="(ig8)": NEXT f
8010 FOR f=2 TO 8: FOR g=2 TO 8:
 READ l$(f,g): NEXT g: NEXT f
8020 DATA "There is a road going
 south"
8030 DATA "(ig8)"
8040 DATA "you are on a road run
ning from  north to south."
8050 DATA "(ig8)","(ig8)"
8060 DATA "You are in a field.Th
ere are     gates to the east and
 to the     south."
8070 DATA "you are on a road run
ning from  east to west."
8080 DATA "you are on a road run
ning from  north to south."
8090 DATA "(ig8)"
8100 DATA "you are on a road run
ning from  north to south."
8110 DATA "(ig8)"
8120 DATA "You are in the west e
nd of a     meadow."
8130 DATA "You are in the east e
nd of a     meadow."
8140 DATA "(ig8)"
8150 DATA "You are in a big fiel
d.there is a swamp to the east."
8160 DATA "Arrgh!!!!....You have
 just        fallen into a swamp."
8170 DATA "You are in some hills
.There is   a swamp to the west."
8180 DATA "(ig8)"
8190 DATA "You are on a huge pla
teau.","(ig8)"
8200 DATA "You are on an island.
Ih front    of you is a beacon wh
ich lacks   a power source.There
is a hole   in the ground."
8210 DATA "You are in a shrubber
y."
8220 DATA "(ig8)"
8230 DATA "you are in a rockery.
there is    a lake to the west."
```

continued on page 84



continued from page 83

```
8240 DATA "You are at the edge o
f a lake.  In the middle there i
s a stone  with a sword in it."
8250 DATA "You are on a huge pla
teau."
8260 DATA "You are at the edge o
f a river  there are trees all a
round you.","(ig8)"
8270 DATA "you are in a meadow.T
here is a  road to the west."
8280 DATA "You are on a road run
ning from  west to east."
8290 DATA "You are in a valley.T
o the east is a road."
8300 DATA "You are in a valley."
8310 DATA "You are on an immense
 plain."
8320 DATA "You are at the edge o
f a river  there are trees all a
round you."
8330 DATA "You are in a forest.I
n front of you is a door in the
ground."
8340 DATA "(ig8)"
8350 DATA "you are in a wood"
8360 DATA "(ig8)"
8370 DATA "You are in a cave"
8380 DATA "You are in a meadow"
8390 DATA "You are at the edge o
f a river  there are trees all a
round you."
8400 DATA "You are in a forest.T
here is a  path running north/so
uth"
8405 DATA "You are in a clearing
.In front  of you is a woodcutte
r's hut."
8410 DATA "you are in a wood."
8420 DATA "You are in a meadow",
"(ig8)"
8430 DATA "You are in a field"
8440 DATA "You are at the edge o
f a river  there are trees all a
round you."
8450 DATA "You are in a forest.T
here is a  path running north/so
uth"
8500 RETURN
9000 LET x=2: LET y=8
9001 DIM o$(9,15): DIM a(9): DIM
 b(9)
9010 FOR f=1 TO 9: READ o$(f),a(
f),b(f): NEXT f
9020 DATA "phone",6,6,"golden ke
y",2,2,"onion",2,7
9030 DATA "candle",3,6,"battery"
,4,2,"wand",6,4
9040 DATA "bone",7,5,"axe",8,2,"
matches",7,3
9050 LET fed=0: LET raft=0
9060 LET loc=1: LET wiz=1
9070 LET lit=0
9100 RETURN
9500 PRINT "Exits:": IF l$(x-1,y
,1)<>"(ig8)" THEN  PRINT "North
"
9510 IF l$(x,y+1,1)<>"(ig8)" THE
N  PRINT "East "
9520 IF l$(x+1,y,1)<>"(ig8)" THE
N  PRINT "South "
9530 IF l$(x,y-1,1)<>"(ig8)" THE
N  PRINT "West "
9540 RETURN
9600 INPUT "Want to quit ?";s$:
IF s$<>"y" THEN  GO TO 30
9610 INPUT "Want to save the gam
e first ?";s$: IF s$<>"y" THEN
STOP
9700 CLS : PRINT "Have blank tap
e ready."
9710 SAVE "adventure" LINE 20
9720 PRINT "O.K....": PAUSE 200:
 GO TO 20
9999 RETURN
```

COMPUTAFILE

NICHOLAS LLOYD of Pembroke, Dyfed wrote **Computafile** for the 16K Spectrum to enable him to keep track of program listings in magazines, so that he does not have to leaf through piles to find his favourites.

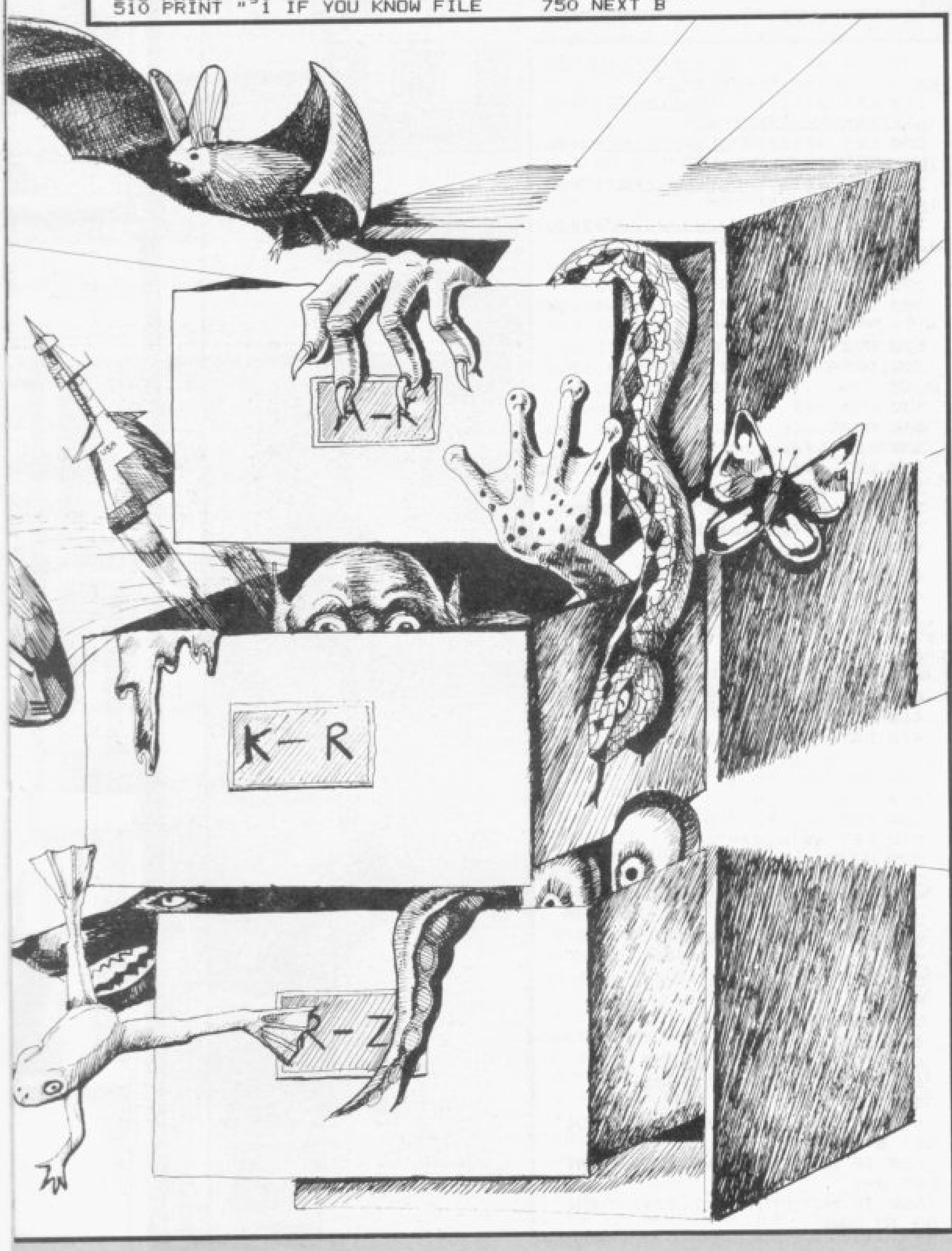
There are load and save options, searching, listing the files, creating a new file and correcting a file. Each file can be cross-referenced in six fields.

If you have a 48K Spectrum you can have more files than the 15 allowed for the 16K machine. To do that, change the number 15 to the number of files you want, up to about 40, in lines 19, 700, 2520, 3220.

The program uses our standard abbreviations for graphics characters, so please read the instructions on the first page of Program Printout.

```
   2 PAPER 7: INK 0: BORDER 7
   5 PRINT AT 10,5;"(5*sp)STOP T
HE TAPE(9*sp)"
   8 PAUSE 150
   9 CLS
  10 PAPER 1: BORDER 1: INK 7
  19 DIM A$(15,6,19)
  20 LET A=1
  30 LET C$="(sp,30*-,sp)"
  40 LET D$="(32*sp)"
  45  LET E$="(14*sp)|(17*sp)"
  60 CLS
  70 PRINT "(12*-)MAIN(2*-)MENU(
9*-)"
  75 INVERSE 1
  77 PRINT "(32*g2)"
  80 PRINT " 1 TO LOAD FILES(16*
sp)"
  85 PRINT C$
  90 PRINT " 2  TO ENTER A NEW F
ILE(10*sp)"
  95 PRINT C$
 100 PRINT " 3 TO SAVE FILES ON
TAPE(8*sp)"
 105 PRINT C$
 110 PRINT " 4 TO LOOK AT A CERT
AIN FILE(4*sp)"
 130 PRINT C$
 150 PRINT " 5  TO LOOK THROUGH
ALL FILES(4*sp)"
 152 PRINT C$
 155 PRINT " 6 TO CHANGE A FILE(
13*sp)"
 170 PRINT C$
 175 PRINT " 7 TO STOP THE PROGR
AM(10*sp)"
 177 PRINT C$
 179 INVERSE 0
 180 PRINT "(6*sp)PRESS APPROPIA
TE KEY(6*sp)"; FLASH 0
 183 PRINT "32*g3"
 185 IF INKEY$="" THEN  GO TO 18
5
 190 IF INKEY$="1" THEN  BEEP 0.
1,30: GO TO 232
 195 IF INKEY$="2" THEN  BEEP 0.
1,30: GO TO 3200
 200 IF INKEY$="3" THEN  BEEP 0.
1.30: GO TO 433
 205 IF INKEY$="4" THEN  BEEP 0.
1,30: GO TO 500
 210 IF INKEY$="5" THEN  BEEP 0.
1,30: GO TO 1250
 215 IF INKEY$="6" THEN  BEEP 0.
1,30: GO TO 2500
 220 IF INKEY$="7" THEN  BEEP 0.
1,30: GO TO 3000
 230 GO TO 185
 232 CLS
 233 PAPER 0: BORDER 0
 234 PRINT "*INSTRUCTIONS FOR LO
ADING FILES*"
 235 INVERSE 1
 240 PRINT "(32*g3)"
 245 PRINT "(3*sp)INSERT TAPE WI
TH FILES ON(4*sp)"
 250 PRINT C$
 255 PRINT "(3*sp)PRESS PLAY ON
TAPE(11*sp"
 260 PRINT C$
 265 PRINT "(3*sp)PRESS ANY KEY
TO START(7*sp)"
 270 PRINT C$
 275 IF INKEY$="" THEN  GO TO 27
5
 276 BEEP 0.1,30
 277 CLS
 279 PAPER 0: BORDER 0
 280 LOAD "FILES"
 281 CLS
 282 PRINT "(32*sp)"
 285 PRINT AT 1,0;"(32*sp)"
 290 PRINT AT 1,1; FLASH 1;"
    STOP THE TAPE          "; FLA
SH 0
 291 INVERSE 0
 292 PRINT  INVERSE 1;" "; INVER
SE 0; PAPER 7; INK 2; BRIGHT 1;"
(2*sp)PRESS ANY KEY TO CONTINUE(
4*sp)"; INK 7; PAPER 1; BRIGHT 0
; FLASH 0
 295 PRINT "(32*g3)"
 296 IF INKEY$="" THEN  GO TO 29
6
 297 PAPER 1: BORDER 1
 298 BEEP 0.1,30: GO TO 60
 433 CLS
 434 PAPER 0: BORDER 0
```

```
435 PRINT "*INSTRUCTIONS FOR SA
VING FILES*"
437 INVERSE 1
440 PRINT "(32*g3)": PRINT "(3*
sp)INSERT BLANK TAPE(12*sp)": PR
INT C$
444 PAPER 0: BORDER 0
445 PRINT " PRESS ANY KEY TO S
TART(8*sp)": PRINT C$
446 IF INKEY$="" THEN  GO TO 44
6
447 BEEP 0.1,30: CLS
448 SAVE "FILES" LINE 3200
449 PRINT "(32*sp)"
450 PRINT AT 1,0; FLASH 1;"(10*
sp) STOP THE TAPE(9*sp)"; FLASH
0: PRINT C$
460 PRINT "(3*sp)REWIND TAPE TO
VERIFY(8*sp)"
465 PRINT C$: PRINT "(3*sp)PRES
S ANY KEY TO START(7*sp)": PRINT
D$
467 INVERSE 0
470 IF INKEY$="" THEN  GO TO 47
0
471 BEEP 0.1,30
472 CLS
475 VERIFY "FILES"
477 CLS
479 PRINT "(32*g3)"
480  PRINT  FLASH 1;AT 1,0;"(8*
sp)STOP THE TAPE(10*sp)"; FLASH
0
481 PRINT  INVERSE 1;" "; INVER
SE 0; PAPER 7; INK 2; BRIGHT 1;"
 PRESS ANY KEY TO CONTINUE(4*SP
)"; INK 7; PAPER 1; BRIGHT 0; FL
ASH 0
482 PRINT "(32*g3)"
485 IF INKEY$="" THEN  GO TO 48
5
487 PAPER 1: BORDER 1
490 BEEP 0.1,30: GO TO 60
500 CLS
502 PRINT "(14*-)MENU(14*-)"
503 INVERSE 1
505 PRINT "g3"
510 PRINT "1 IF YOU KNOW FILE
NUMBER      "
515 PRINT C$
520 PRINT " 2 FOR FILE NUMBERS
AND FOR(5*sp)": PRINT " NAMES OF
 COMPUTER MAGAZINE(5*sp)"
525 PRINT C$
530 PRINT " 3 TO LOOK AT DATE O
F MAGAZINE  ";" AND NAME OF PROG
RAM(12*sp)"
535 PRINT C$
540 PRINT " 4 FOR THE PAGE NUMB
ER OF THE(4*sp)";"MAGAZINE AND W
ICH TAPE IT IS ON"
545 PRINT C$
547 PRINT " 5 TO GOTO MAIN MENu
(12*sp)"
550 PRINT C$
559 PRINT D$: PRINT AT 15,1; FL
ASH 1;"(6*sp)PRESS APPROPIATE KE
Y(4*sp)"
560 PRINT "(32*g3)"
565 INVERSE 0
625 IF INKEY$="1" THEN  BEEP 0.
1,30: INPUT "INPUT PAGE NUMBER "
;E: BEEP 0.1,30: GO TO 700
630 IF INKEY$="2" THEN  BEEP 0.
1,30: GO TO 1000
640 IF INKEY$="3" THEN  BEEP 0.
1,30: GO TO 1050
650 IF INKEY$="4" THEN  BEEP 0.
1,30: GO TO 1120
660 IF INKEY$="5" THEN  BEEP 0.
1,30: GO TO 60
669 IF INKEY$="" THEN  GO TO 66
9
670 GO TO 610
700 IF E<1 OR E>15 THEN  PRINT
"NO SUCH FILE.": PAUSE 60: CLS :
 GO TO 500
705 RESTORE 300: CLS
710 READ B$: PRINT B$;E
720 FOR B=2 TO 6
730 PRINT "(32*-)"
740 READ B$: PRINT B$;: PRINT A
$(E,B)
745 POKE 23692,255
747 PAUSE 90
750 NEXT B
760 PRINT C$
770 PRINT " PRESS ANY KEY TO GO
TO MENU  "
790 IF INKEY$="" THEN  GO TO 79
0
900 BEEP 0.1,30: GO TO 500
1000 CLS
1005 PRINT "|FILE(9*sp)|MAGAZINE
(8*sp)|"
1010 FOR B=1 TO A
1015 PRINT E$
1020 PRINT A$(B,1);A$(B,2)( TO 1
3)
1027 POKE 23692,255
1028 PAUSE 30
1030 NEXT B
1040 PRINT "PRESS ANY KEY TO GOT
O MENU.  "
1045 IF INKEY$="" THEN  GO TO 10
45
1047 BEEP 0.1,30: GO TO 500
1050 CLS
1070 PRINT "|DATE OF MAGAZINE|TH
E PROGRAM  |"
1080 FOR B=1 TO A
1085 PRINT "(17*-)|(14*-)"
1090 PRINT A$(B,3);A$(B,4)( TO 1
3)
1096 POKE 23692,255
1098 PAUSE 30
1100 NEXT B
1102 PRINT "PRESS ANY KEY TO GOT
O MENU.(3*sp)"
1105 IF INKEY$="" THEN  GO TO 11
05
1107 BEEP 0.1,30: GO TO 500
1120 CLS
1150 PRINT "|PAGE NUMBER  |TAPE
NUMBER(5*sp)|"
1160 FOR B=1 TO A
1165 PRINT E$
1170 PRINT A$(B,5);A$(B,6)( TO 1
3)
1176 POKE 23692,255
1177 PAUSE 30
1180 NEXT B
1182 PRINT "PRESS ANY KEY TO GOT
O MENU.(4*sp)"
1185 IF INKEY$="" THEN  GO TO 11
85
1190 BEEP 0.1,30: GO TO 500
1250 CLS
1255 FOR E=1 TO A-1
1260 RESTORE 300: CLS
1265 FOR B=1 TO 6
1270 READ B$
1275 PRINT B$;A$(E,B)
1280 PRINT C$
1284 POKE 2369,255: PAUSE 30
1285 NEXT B
1287 IF E=A-1 THEN  PRINT "THAT
IS ALL THE FILES.": PAUSE 200: G
O TO 60
1290 PRINT " PRESS ANY KEY TO CO
N M TO MENU"
1295 IF INKEY$="" THEN  GO TO 12
95
1297 BEEP 0.1,30
1300 IF INKEY$="M" THEN  GO TO 6
0
1310 CLS : NEXT E
2000 CLS
2010 BEEP 0.1,30: GO TO 60
2500 RESTORE 300: CLS
2510  INPUT "WHAT PAGE DO YOU WA
NT TO CHANGE";E
2515 BEEP 0.1,30
2520 IF E<1 OR E>15 THEN  GO TO
2510
2530 PRINT "WHAT WOULD YOU LIKE
 TO CHANGE ?"
2540 BEEP 0.1,30
2550 FOR C=1 TO 6
2555 READ B$
2560 PRINT C;B$;A$(E,C)
2570 NEXT C
2580 INPUT "CHANGE (9  TO MENU)"
;D
2581 BEEP 0.1,30
2582 IF D=9 THEN  GO TO 60
2590 IF D<2 OR D>6 THEN  GO TO 2
580
2600 INPUT "THE NEW VERSION";A$(
E,D)
2610 CLS : RESTORE 300: GO TO 25
30
2700 CLS
3000 PAPER 7: BORDER 7
3010 FOR J=0 TO 2
3020 FOR K=0 TO 31
3030 LET H$="(11*sp)FILE CLOSED
"
3040 CLS
3050 INK 2: PRINT AT 10,K;H$: IN
K 7
3060 PAUSE 5
3070 NEXT K
3080 NEXT J
3090 NEW
3200 PAPER 1: BORDER 1
3205 DATA " FILE NUMBER(16*.)","
 NAME OF MAGAZINE(7*.)"," DATE O
F MAGAZINE(6*.)"," THE NAME OF T
HE GAMEPOINT (11*.) "," PAGE NUM
BER(13*.)"," TAPE NUMBER(14*.)"
3210 CLS : RESTORE 300
3220 IF A>=15 THEN  PRINT "NO MO
RE ROOM  FOR DATA .": GO TO 4150
3230 LET A$(A,1)=STR$ A
3240 PRINT "ENTER NEW FILE"
3250 PRINT : READ B$: PRINT B$;A
3300 FOR B=2 TO 6: READ B$
3310 INPUT (B$);A$(A,B)
3320 BEEP 0.1,30
3400 PRINT B$;A$(A,B)
3410 PRINT "(32*-)"
4000 NEXT B
4050 LET A=A+1
4100 PRINT "PRESS C TO CONTIUE E
NTERING(5*SP)FILES."
4150 PRINT "PRESS ANY KEY  TO GO
TO MENUE.(3*SP)"
4200 IF INKEY$="" THEN  GO TO 42
00
4250 IF INKEY$="C" THEN  BEEP 0.
1,30: GO TO 3200
4300 BEEP 0.1,30: GO TO 60
```



Listing 1

```
   5 BORDER 0: PAPER 0: INK 6: C
LS
  10 FOR n=USR "a". TO USR "T"+7
  20 READ a: POKE n,a
  30 NEXT n
  40 DATA 0,6,24,52,36,24,57,126
,124,120,124,108,108,72,72,36
  50 DATA 0,96,28,44,36,24,60,12
6,62,126,126,100,70,34,34,68
  60 DATA 24,24,36,36,24,61,61,1
26,124,188,28,34,34,34,34,65
  70 DATA 255,153,255,204,216,24
0,224,192,255,153,255,0,0,0,0,0
  80 DATA 8,28,54,99,198,108,56,
16,255,8,255,129,255,8,255,129
  90 DATA 255,197,169,145,169,19
7,255,129,129,129,129,127,129,12
9,129,129
 100 DATA 255,128,191,160,160,16
0,160,160,255,0,255,0,0,0,0,0
 110 DATA 255,1,253,5,5,5,5,5,16
0,160,160,160,160,191,128,255
 120 DATA 0,0,0,0,0,255,0,255,5,
5,5,5,5,253,1,255
 130 DATA 128,64,47,31,7,7,4,4,0
,31,255,254,252,212,68,56
 140 PRINT AT 1,10; FLASH 1;"CLE
ANER"
 145 PRINT AT 3,4;"written by Ro
bert Osborn"
 150 PRINT AT 5,4;
 160 PRINT "Guide Pat round the(
12*sp)building site to(13*sp)cle
an rhe windows(15*sp)BEWARE of f
alling(15*sp)bricks and deadly(1
5*sp)wheel barrows...."
 170 PRINT AT 14,10; INVERSE 1;"
KEYS"
 180 PRINT AT 16,4;
 190 PRINT "q -RIGHT(8*sp)w -LEF
T"'';TAB 10;"Space -JUMP"
 200 PRINT #0;TAB 9; FLASH 1;"PL
EASE WAIT"''
 210 LOAD ""
 999 REM remember to save this:
SAVE "CLEANER" LINE 1
```

Listing 2

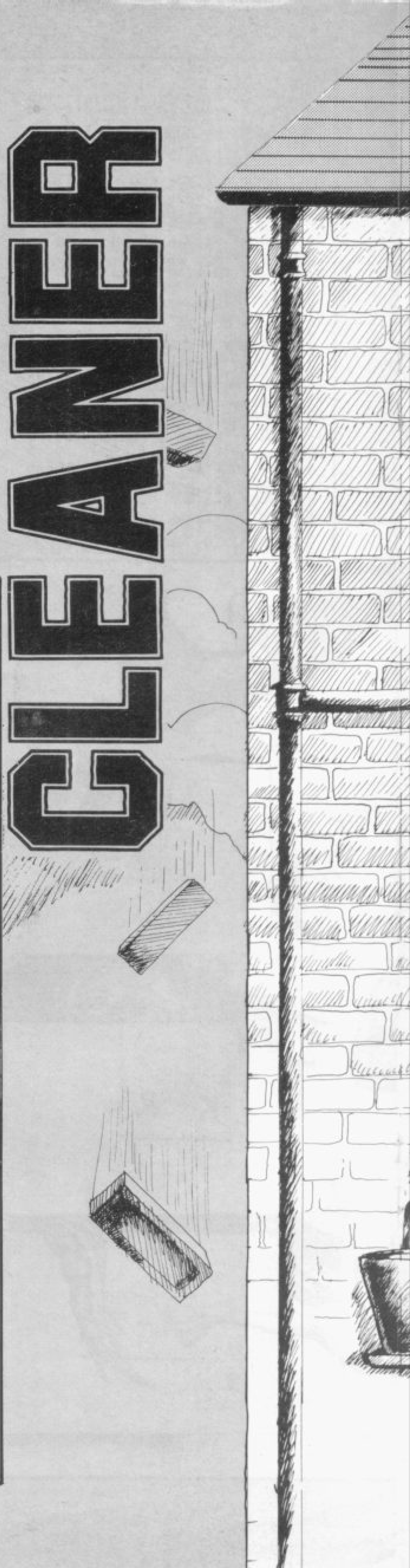
```
  10 DIM a$(22,32)
  20 LET hs=0
  25 LET l=10: LET ld=1: LET lr=
0
  30 LET s=1: LET t=0: LET sc=0:
 LET li=4
  40 GO SUB 200
  50 LET o=21: LET p=2: LET lr=0
: LET x=2: LET y=20: LET d=0
  70 IF s THEN  GO SUB 560
  75 GO SUB 1600
  80 GO SUB 1600
  90 GO SUB 700: GO SUB 1100: GO
 SUB 1000
 100 GO TO 600
 110 GO SUB 1050
 120 IF d=1 THEN  GO SUB 1300: I
F r<>1 THEN  LET x=x+1
 130 IF d=2 THEN  GO SUB 1300: I
F r<>2 THEN  LET x=x-1
 140 GO SUB 1000
 150 GO SUB 1500: IF sc=t*660+66
0 THEN  GO TO 3000
 160 GO SUB 1400: IF r THEN  GO
TO 2000
 170 GO SUB 1200: IF NOT r AND N
OT lr THEN  GO SUB 900: IF NOT r
 AND NOT lr THEN  GO TO 2000
 180 GO SUB 1100: GO SUB 700
 190 GO TO 100
 200 REM data
 201 RESTORE
 205 FOR n=1 TO 22
 210 LET a$(n)="J(30*sp)J"
 220 NEXT n
```

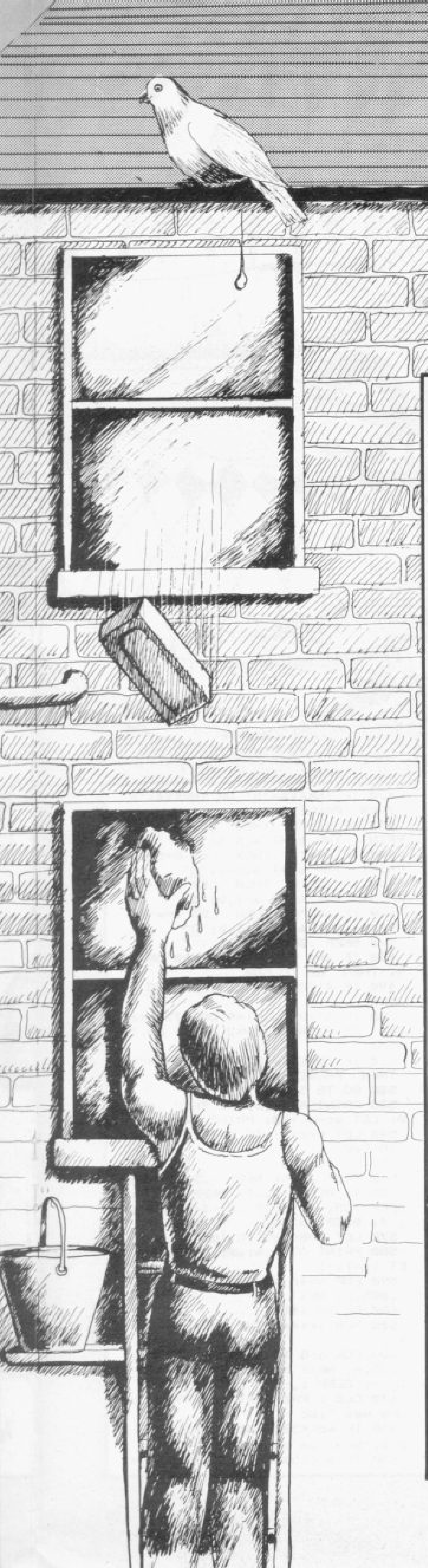
WORK ON the new housing estate is drawing to a close and the windows have to be cleaned. Robert Osborn of Moray in Scotland has cast you as the cleaner in a program for the 16K Spectrum. Clean all the windows on the site, but beware of falling bricks and lethal wheelbarrows.

The first listing contains user-defined graphics. Save the program according to the instructions in line 999 before you run it. Wipe out the first listing and type in the second, saving it according to line 9999.

***Cleaner** uses special graphics instructions. Please read the explanation on the first page of Program Printout before you enter the listings.*

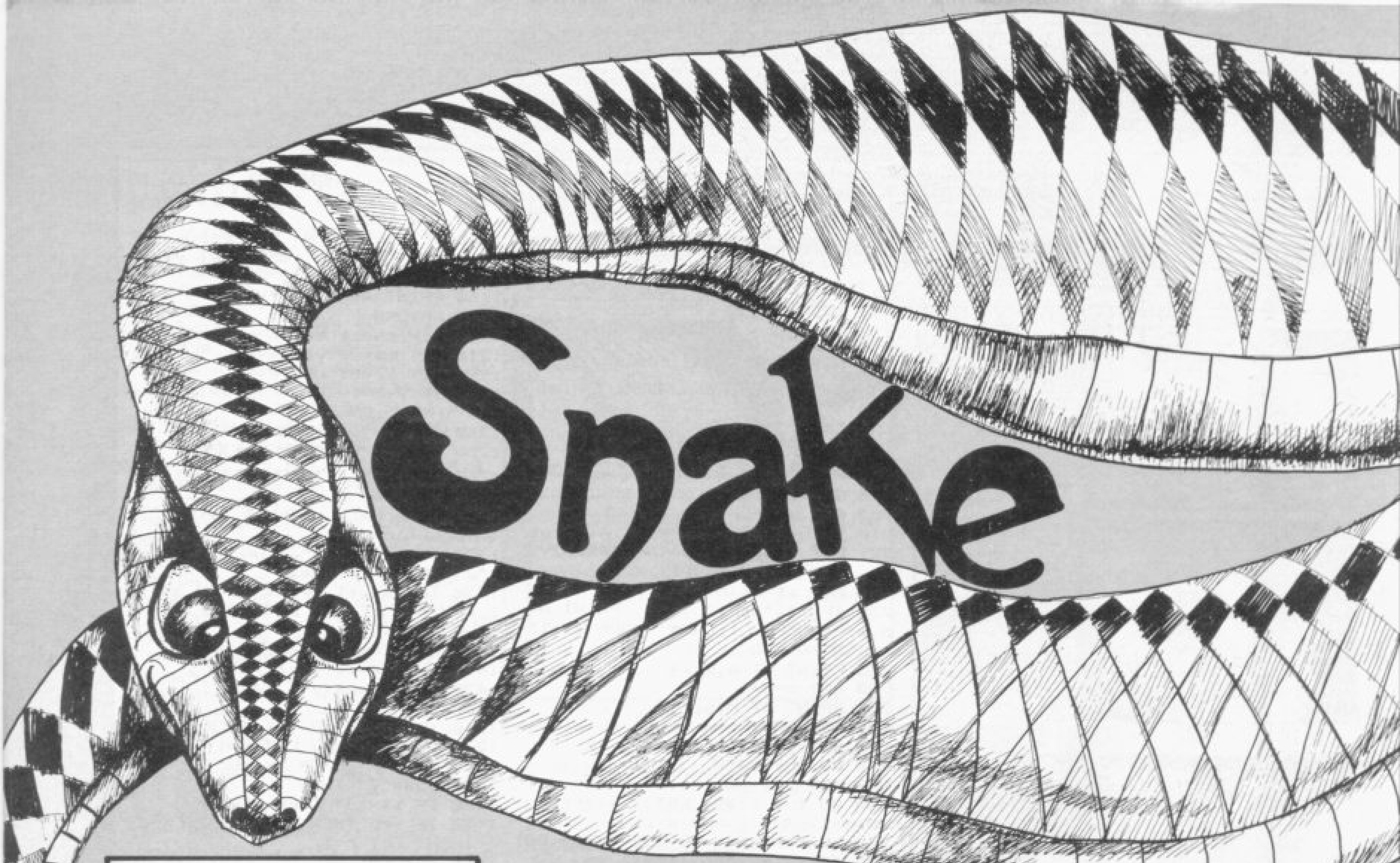
```
 230 LET a$(6)="JKKKKKKKKKKKKKK
KK(sp)KKK(sp)KKKKKKKJ"
 240 LET a$(11)="JKKKKKKKKK(3*sp
)KKKKKKKKKKKKKKKKKKJ"
 250 LET a$(16)="JKKKKKKKK(2*sp
)KKKKKKKKKKKKKKKKKKKKJ"
 260 LET a$(19)="JKKKKKKK(17*sp
)KKKKJ"
 270 LET a$(22)="JJJJJJJJJJJJJJJ
JJJJJJJJJJJJJJJJJ"
 280 FOR n=1 TO 5
 290 READ x,y
 300 LET a$(y,x)="S": LET a$(y,x
+1)="T"
 310 NEXT n
 320 DATA 4,5,5,21,15,21,14,15,2
0,10
 330 FOR n=1 TO 11
 340 READ x,y
 350 LET a$(y,x)="M"
 360 LET a$(y,x+1)="N"
 370 LET a$(y,x+2)="O"
 380 LET a$(y+1,x)="P"
 390 LET a$(y+1,x+1)="Q"
 400 LET a$(y+1,x+2)="R"
 410 NEXT n
 420 DATA 7,3,12,3,26,3,4,8,15,8
,25,8,6,13,17,13,22,13,27,13,20,
19
 430 FOR n=1 TO 9
 440 READ x,y
 450 LET a$(y,x)="J"
 460 NEXT n
 470 DATA 17,5,18,5,21,5,24,5,10
,21,11,21,12,21,10,7,24,10
 480 FOR n=1 TO 2
 490 READ x,y,h
 500 FOR m=y TO y+h
 510 LET a$(m,x)="L"
 520 NEXT m
 530 NEXT n
 540 DATA 2,6,4,23,8,2
 550 RETURN
 560 REM print screen
 570 CLS
 580 FOR n=1 TO 22: PRINT a$(n):
 NEXT n
 590 RETURN
 600 REM keys
 610 POKE 16384,IN 64510
 620 POKE 16640,IN 32766
 630 LET d=0
 640 IF NOT POINT (7,175) THEN
LET d=2
 650 IF NOT POINT (6,175) THEN
LET d=1
 660 IF NOT POINT (7,174) THEN
GO TO 800
```





```
 670 GO TO 110
 700 REM brick
 710 IF o=21 THEN  PRINT AT o,p;
"J": LET o=1: LET p=INT (RND*29+
1)
 720 LET z$=a$(o+1,p+1)
 730 IF z$<"(sp)" THEN  PRINT AT
 o,p; INVERSE 1;CHR$ (CODE z$+15
6): GO TO 750
 740 PRINT AT o,p;z$
 750 LET o=o+1
 760 PRINT AT o,p;"I"
 790 RETURN
 800 REM jump
 810 GO SUB 1050
 820 FOR y=y TO y-1 STEP -1
 830 GO SUB 1300: LET x=x+(r<>1
AND d=1)-(r<>2 AND d=2)
 840 GO SUB 700: GO SUB 1000: GO
 SUB 1500: GO SUB 1100
 845 GO SUB 1400: IF r THEN  GO
TO 2000
 850 GO SUB 1050: NEXT y
 860 FOR y=y TO y+1
 870 GO SUB 1300: LET x=x+(r<>1
AND d=1)-(r<>2 AND d=2)
 880 GO SUB 700: GO SUB 1000: GO
 SUB 1500: GO SUB 1100: GO SUB 1
200: IF r OR lr THEN  GO TO 100
 890 GO SUB 1400: IF r THEN  GO
TO 2000
 895 GO SUB 1050: NEXT y: GO SUB
 900: IF NOT r AND NOT lr THEN
GO TO 2000
 896 GO TO 100
 900 REM fall 3 steps
 910 LET z=56: GO SUB 1050
 920 FOR y=y TO y+2
 930 GO SUB 1000
 940 GO SUB 1400: IF r THEN  GO
TO 2000
 960 GO SUB 1200: IF r OR lr THE
N  RETURN
 970 BEEP .01,z: LET z=z-2: GO S
UB 1500: GO SUB 1100
 980 GO SUB 1050: NEXT y
 990 RETURN
1000 REM print man
1010 IF d=1 THEN  LET x$="A": LE
T y$="B"
1020 IF d=2 THEN  LET x$="C": LE
T y$="D"
1030 IF NOT d THEN  LET x$="E":
LET y$="F"
1040 PRINT AT y-1,x;x$;AT y,x;y$
: RETURN
1050 REM undraw
1055 LET z$=a$(y,x+1)
1060 IF z$<"(sp)" THEN  PRINT AT
 y-1,x; INVERSE 1;CHR$ (CODE z$+
156): GO TO 1070
1065 PRINT AT y-1,x;z$
1070 LET z$=a$(y+1,x+1)
1075 IF z$<"(sp)" THEN  PRINT AT
 y,x; INVERSE 1;CHR$ (CODE z$+15
6): RETURN
1080 PRINT AT y,x;z$
1090 RETURN
1100 REM lift
1110 IF l>17 THEN  LET ld=2
1120 IF l<9 THEN  LET ld=1
1130 PRINT AT l,10;"(2*sp)"
1140 IF ld=1 THEN  LET l=l+1: IF
 lr THEN  GO SUB 1050: LET y=y+1
: GO SUB 1000
1150 IF ld=2 THEN  LET l=l-1: IF
 lr THEN  GO SUB 1050: LET y=y-1
: GO SUB 1000
1160 PRINT AT l,10;"HH"
1170 RETURN
1200 REM check below
1210 LET z$=a$(y+2,x+1)
1220 LET lr=0: LET r=0
1230 IF y+1=l THEN  IF x=10 OR x
=11 THEN  LET lr=1
1240 IF z$="J" THEN  LET r=1
1250 IF z$="K" THEN  LET r=1
1260 IF z$="L" THEN  LET r=1
1290 RETURN
1300 REM check right & left
1310 LET r=0
1320 IF a$(y,x)="J" OR a$(y+1,x)
="J" THEN  LET r=2
1330 IF a$(y+1,x+2)="J" OR a$(y+
1,x+2)="J" THEN  LET r=1
1390 RETURN
1400 REM check obstacles
1410 LET z$=a$(y,x+1)
1420 LET v$=a$(y+1,x+1)
1430 LET r=0
1440 IF y-1=l OR y=l THEN  IF x=
10 OR x=11 THEN  LET r=1
1450 IF z$="S" OR v$="S" OR z$="
T" OR v$="T" THEN  LET r=1
1460 IF z$="J" THEN  LET r=1
1470 IF x=p THEN  IF y=o OR y-1=
o THEN  LET r=1
1490 RETURN
1500 REM check windows
1510 LET z$=a$(y,x+1)
1520 IF z$>="M" AND z$<="R" THEN
  LET a$(y,x+1)=CHR$ (CODE z$-15
6): LET sc=sc+10: GO SUB 1600
1590 RETURN
1600 REM score
1610 LET z=USR 3438
1620 PRINT #0; BRIGHT 1; INK 4;"
(2*sp)SCORE :"; INK 6;sc; INK 4;
TAB 16;"LIVES ";
1630 FOR n=1 TO li
1640 PRINT #0; INK n+1;"A";
1650 NEXT n
1690 RETURN
2000 REM dead
2005 PRINT AT o,p;a$(o+1,p+1)
2010 LET z=50: GO SUB 1050
2020 FOR y=y TO 20
2030 GO SUB 1000
2040 BEEP .01,z
2050 LET z=z-2
2060 GO SUB 1050
2070 NEXT y
2080 LET li=li-1
2090 IF li>0 THEN  LET s=0: GO T
O 50
2100 FOR n=50 TO 0 STEP -1: BEEP
 .005,RND*60: BEEP .01,n: NEXT n
2105 LET z=USR 3438
2110 IF sc>hs THEN  LET hs=sc: P
RINT  0;"WELL DONE YOU HAVE THE
NEW HIGH"
2120 PRINT #0;TAB 8;"YOUR SCORE
";sc;TAB 4;"HAVING COMPLETED ";t
;" SCREENS";TAB 8;"HIGH SCORE ";
hs
2130 PRINT #0;'TAB 8;"PRESS ANY
KEY"
2190 PAUSE 0: GO TO 25
3000 REM finished
3010 FOR n=1 TO 50
3015 BEEP .01,RND*60
3020 BEEP .01,n
3030 NEXT n
3040 BEEP .1,10: BEEP .1,10: BEE
P .8,0
3050 LET li=li+1: LET t=t+1: GO
SUB 200: GO TO 50
9999 REM don't forget to save th
is      : SAVE "CL" LINE 1
```

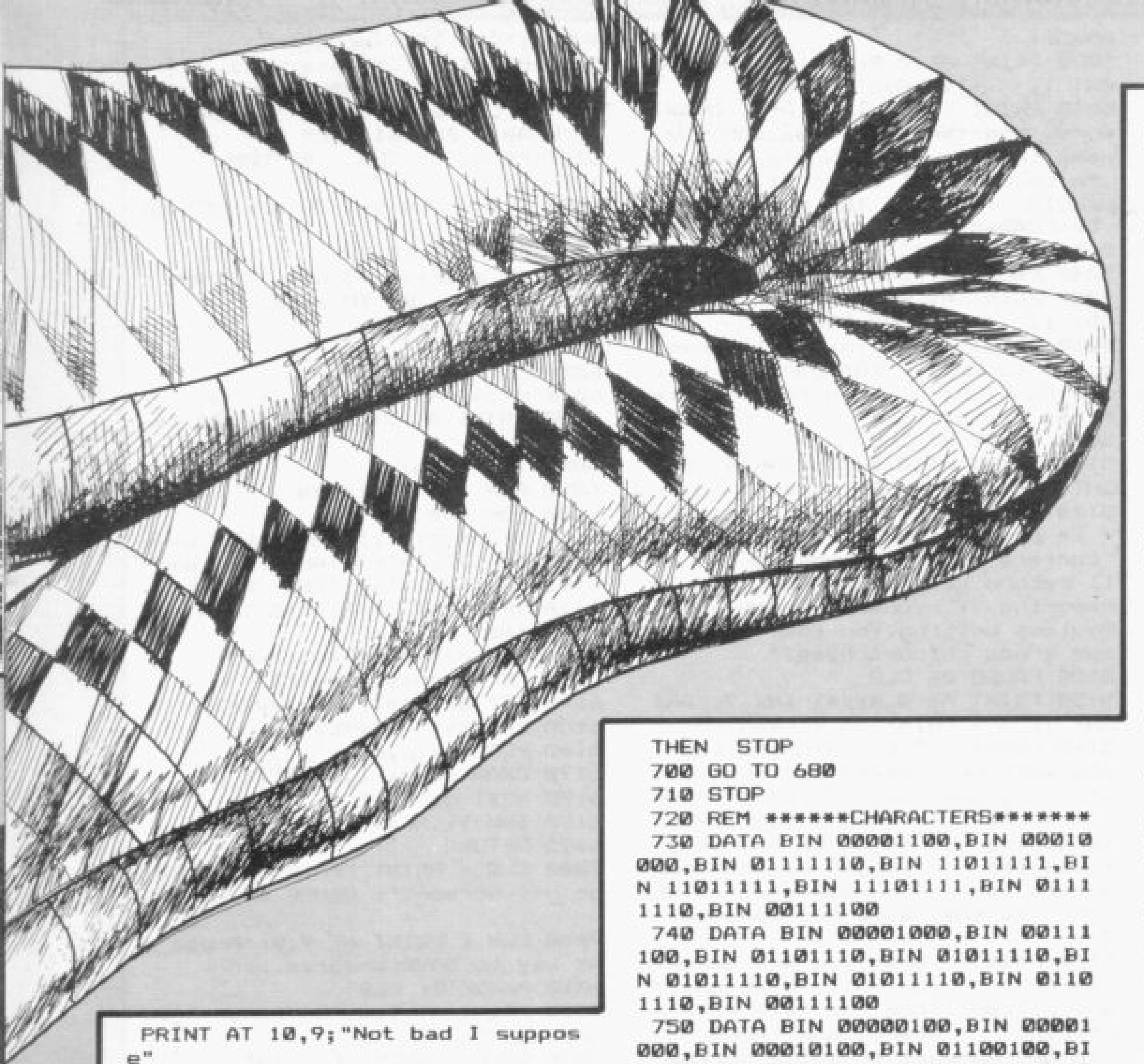
Snake



FRESH FRUIT and plenty of it — just the thing for a hungry snake. Guide the serpent around the screen eating the fruit but avoiding the snake poison. As you gobble your dinner, you will grow in size; avoid mistaking your tail for a strawberry or you will die. **Snake** was written by Philip Cole from Rickmansworth in Hertfordshire and runs on the 16K Spectrum.

The program uses special graphics characters, so please read the instructions on the first page of Program Printout before you type in the listing.

```
  10 REM ******** MENU *********
  20 LET z=0: LET i=0: BORDER 0:
 PAPER 0: INK 7: CLS
  30 PRINT  FLASH 1; PAPER 2;AT
2,11;"S N A K E"
  50 PRINT AT 10,8;"1..INSTRUCTI
ONS";AT 13,8;"2..START"
  60 FOR n=1 TO 48: READ a: BEEP
 .2,a
  70 IF INKEY$="1" THEN  LET i=1
: GO TO 720
  80 IF INKEY$="2" THEN  LET z=1
: IF INKEY$="2" THEN  GO TO 720
  90 DATA -6,-2,1,3,4,3,1,-2,-6,
-2,1,3,4,3,1,-2,-1,3,6,8,9,8,6,3
,-6,-2,1,3,4,3,1,-2,1,5,8,10,11,
10,8,5,-1,3,6,8,9,8,6,3
 100 NEXT n
 110 RESTORE a: GO TO 60
 120 REM ***DIFFICULTY LEVEL***
 130 CLS : PRINT  FLASH 1; PAPER
 2;AT 5,6;"DIFFICULTY LEVEL"
 140 PRINT AT 8,0;"What speed do
 you  require (0 TO 20)?"
 150 PRINT AT 11,0;"  FAST......
0-9": PRINT "  MODERATE..10-15":
 PRINT "  SLOW......16-20"
 160 INPUT lp
 170 LET t=0: LET c=0: LET lv=5:
 LET sc=0: LET df=5
 180 LET c=c+1
 190 IF lv=0 THEN  GO TO 610
 200 IF c=3 THEN  LET df=df+5: I
F C=3 THEN  LET c=1
 210 CLS : FOR n=0 TO 31: PRINT
 INK 2;AT 21,n;"(ig8)";AT 1,n;"(
ig8)": NEXT n
 220 FOR n=1 TO 21: PRINT  INK 2
;AT n,0;"(ig8)";AT n,31;"(ig8)":
 NEXT n
 230 PRINT AT 0,0;"Score-";AT 0,
20;"Snakes:"
 240 FOR n=27 TO lv+26: PRINT  I
NK 6;AT 0,n;"E": NEXT n
 250 PRINT AT 0,7;sc
 260 FOR n=1 TO 10: LET y=INT (R
ND*19)+2: LET z=INT (RND*29)+2
 270 PRINT  INK 6;AT y,z;"I": NE
XT n
 280 FOR n=1 TO df
 290 LET w=INT (RND*19)+2: LET u
=INT (RND*29)+2
 300 IF ATTR (w,u)=4 OR ATTR (w,
u)=3 OR ATTR (w,u)=2 THEN  GO TO
 290
 310 IF c=1 THEN  PRINT  INK 4;A
T w,u;"A": NEXT n
 320 IF c=2 THEN  PRINT  INK 3;A
T w,u;"B": NEXT n
 330 IF c=3 THEN  PRINT  INK 2;A
T w,u;"C": NEXT n
 340 LET a=INT (RND*19)+2: LET b
=1
 350 LET s$="E": LET d$=INKEY$
 360 IF d$="" THEN  LET d$=s$
 370 IF INKEY$="Q" OR INKEY$="q"
 THEN  LET s$="G"
 380 IF INKEY$="A" OR INKEY$="a"
 THEN  LET s$="H"
 390 IF INKEY$="N" OR INKEY$="n"
 THEN  LET s$="F"
 400 IF INKEY$="M" OR INKEY$="m"
 THEN  LET s$="E"
 410 PRINT  INK 7;AT a,b; OVER 1
;s$: FOR n=0 TO lp: NEXT n
 420 IF INKEY$="B" OR INKEY$="b"
 THEN  PAUSE 4e4
 430 IF s$="E" THEN  LET b=b+1:
PRINT  INK 6;AT a,b-1;"D"
 440 IF s$="F" THEN  LET b=b-1:
PRINT  INK 6;AT a,b+1;"D"
 450 IF s$="H" THEN  LET a=a+1:
PRINT  INK 6;AT a-1,b;"D"
 460 IF s$="G" THEN  LET a=a-1:
PRINT  INK 6;AT a+1,b;"D"
 470 BEEP .005,0
 480 IF a=1 OR a=21 OR b=0 OR b=
31 THEN  GO TO 580
 490 IF ATTR (a,b)=6 THEN  GO TO
 580
 500 IF ATTR (a,b)=4 OR ATTR (a,
b)=3 OR ATTR (a,b)=2 THEN  GO TO
 530
 510 IF INKEY$="B" OR INKEY$="b"
 THEN  PAUSE 4e4
 520 GO TO 370
 530 PRINT AT a,b;S$: BEEP .05,5
0: LET sc=sc+10: PRINT AT 0,7;sc
 540 LET t=t+1: IF t=DF THEN  GO
 TO 560
 550 GO TO 370
 560 BEEP .5,4: BEEP .25,2: BEEP
 .25,1: BEEP .25,4: BEEP .25,2:
BEEP .25,-1: BEEP .5,-3: BEEP .5
,-4: BEEP .5,-3
 570 LET t=0: GO TO 180
 580 PRINT AT a,b;s$: LET t=0: L
ET lv=lv-1
 590 FOR n=40 TO 0 STEP -5: BEEP
 .005,n: NEXT n
 600 GO TO 190
 610 REM *******THE END*********
*
 620 FOR n=8 TO -7 STEP -1: BEEP
 .25,n: NEXT n: BEEP 1,-8: BEEP
1,-9: BEEP 1,-8
 630 CLS : PRINT AT 5,8;"Your sc
ore was ";sc
 640 IF sc<=500 THEN  PRINT AT 1
0,6;"What an embarassment !!"
 650 IF sc<1500 AND sc>500 THEN
```



```
 PRINT AT 10,9;"Not bad I suppos
e"
 660 IF sc>1500 THEN  PRINT AT 1
0,10;"Well done !!"
 670 PRINT AT 20,1;"Do you want
another go (y/n) ?"
 680 IF INKEY$="y" OR INKEY$="Y"
 THEN  RUN
 690 IF INKEY$="n" OR INKEY$="N"
 THEN  STOP
 700 GO TO 680
 710 STOP
 720 REM ******CHARACTERS*******
 730 DATA BIN 00001100,BIN 00010
000,BIN 01111110,BIN 11011111,BI
N 11011111,BIN 11101111,BIN 0111
1110,BIN 00111100
 740 DATA BIN 00001000,BIN 00111
100,BIN 01101110,BIN 01011110,BI
N 01011110,BIN 01011110,BIN 0110
1110,BIN 00111100
 750 DATA BIN 00000100,BIN 00001
000,BIN 00010100,BIN 01100100,BI
N 10110110,BIN 11111011,BIN 0110
1111,BIN 00000110
 760 DATA BIN 01111110,BIN 11111
111,BIN 11111111,BIN 11111111,BI
N 11111111,BIN 11111111,BIN 1111
1111,BIN 01111110
 770 DATA 0,BIN 01111110,BIN 111
11011,BIN 11111111,BIN 11011111,
BIN 11100000,BIN 11111110,BIN 11
111100
 780 DATA 0,BIN 01111110,BIN 110
11111,BIN 11111111,BIN 11111011,
BIN 00000111,BIN 01111111,BIN 00
111111
 790 DATA BIN 00011000,BIN 00100
100,BIN 00111100,BIN 01011010,BI
N 01111110,BIN 01111110,BIN 0111
1110,BIN 00111100
 800 DATA BIN 00111100,BIN 01111
110,BIN 01111110,BIN 01111110,BI
N 01011010,BIN 00111100,BIN 0010
0100,BIN 00011000
 810 DATA 0,0,0,0,0,BIN 00111100
,BIN 01111110,BIN 11111111
 820 RESTORE 130: FOR n=144 TO 1
52: FOR m=0 TO 7: READ a: POKE U
SR CHR$ (n)+m,a: NEXT m: NEXT n
 840 IF z=1 THEN  GO TO 120
 860 REM ******INSTRUCTIONS*****
 870 CLS : PRINT  FLASH 1; PAPER
 2;AT 0,10;"INSTRUCTIONS"
 880 PRINT : PRINT " EAT THE FRU
IT,BUT BEWARE OF THEPOISON AND Y
OURSELF !!"
 890 PRINT : PRINT "Guide the sn
ake by the keys..."
 900 PRINT : PRINT " UP.......Q(
5*sp)DOWN.....A": PRINT " LEFT..
...N(5*sp)RIGHT....M": PRINT "(8
*sp)(PAUSE....B)"
 910 PRINT : PRINT "Eating the f
ruits..."
 920 PRINT : PRINT " APPLES.....
"; INK 4;"A": PRINT " PLUMS.....
."; INK 3;"B": PRINT " CHERRIES.
.."; INK 2;"C"
 930 PRINT : PRINT "And avoiding
..."
 940 PRINT : PRINT " THE SNAKE P
OISON........."; INK 6;"I"
 950 PRINT : PRINT AT 21,5;"Any
key to continue..."
 960 IF INKEY$="" THEN  GO TO 96
0: RETURN
 970 RUN
```

BIG PRINT

WRITING DISPLAY lettering on the screen can be a tedious task. **Big Print** by Steven Spendley of Strood, Kent allows you to enter a word or phrase and specify how large you wish it to be printed. You can alter the proportions of letters and also print to any part of the screen.

The program was written for the 16K Spectrum. When you have typed in the listing enter GOTO 9000 and the program will SAVE and VERIFY itself.

```
  10 FLASH 0: OVER 0: BRIGHT 0:
INVERSE 0: CLS
  20 DIM a$(100,32)
  30 DIM x(100): DIM y(100)
  40 DIM w(100): DIM v(100)
  50 DIM d$(100): DIM i(100)
  60 LET co=0
  70 PRINT  INVERSE 1;AT 0,0;" C
haracter Enlarger -  SJS 1984 "
  80 PRINT AT 5,0;" 1  TO SAVE p
icture on Tape."''" 2  TO COPY p
icture on Printer."
  90 PRINT AT 10,0;" 3 TO CLEAR
Screen."''" 4 TO PRINT on Screen
."
 100 PRINT AT 15,0;" 5 FOR INSTR
UCTIONS."''" 6 TO SAVE program."
 110 LET i$=INKEY$
 120 IF CODE i$<49 OR CODE i$>54
 THEN  GO TO 110
 130 IF i$="6" THEN  GO TO 9000
 140 GO SUB 1000*VAL i$
 150 GO TO 65
1000 REM * SAVE *
1010 CLS
1020 PRINT "    Type Name of Pic
ture."
1030 PRINT "  Then press the ENT
ER key."
1040 INPUT n$
1050 IF n$="" OR LEN n$>10 THEN
 PRINT ''"Invalid name (1-10 let
ters only)": GO TO 1040
1060 GO SUB 6000
1065 PRINT AT 21,0;"
                               "
1070 SAVE n$SCREEN$
1080 PRINT AT 21,0;n$;" is SAVEd
."''"Press any key to return to
menu.": PAUSE 0: RETURN
2000 REM * PRINT *
2010 CLS : GO SUB 6000
2020 COPY : RETURN
3000 REM * Clear *
3010 CLS
3020 INPUT "Clear Writing? [y/n]
:";z$
3030 IF z$="Y" OR z$="y" THEN  G
O TO 3100
3040 IF INKEY$="n" OR INKEY$="N"
 THEN  RETURN
3050 GO TO 3020
3100 INPUT "Paper (0-7):",pap
3110 IF pap<0 OR pap>7 THEN  GO
TO 3100
3120 INPUT "INK:",ink
3130 IF ink<0 OR ink>7 THEN  GO
TO 3120
3140 INPUT "Border:";bod
3150 IF bod<0 OR bod>7 THEN  GO
TO 3140
3160 INK ink: PAPER pap: BORDER
```

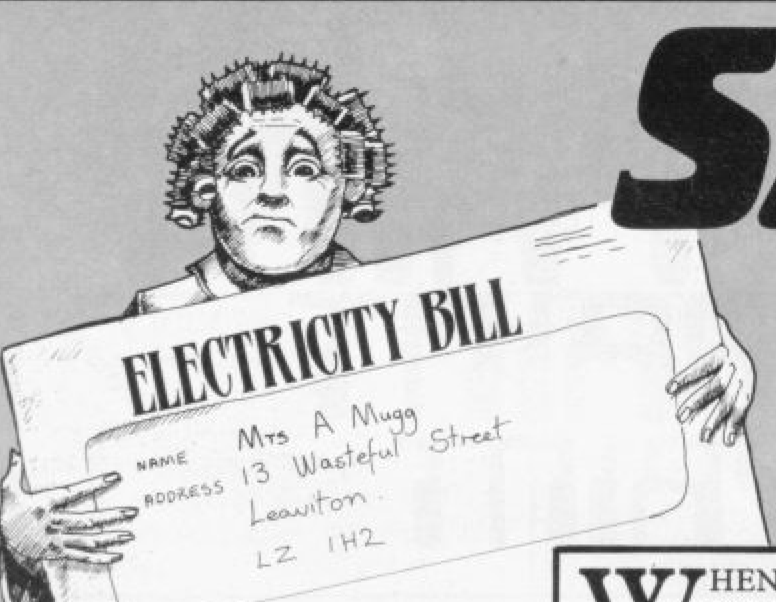
continued on page 90

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```
bod: CLS : RUN
4000 REM * Print *
4010 CLS
4020 INPUT "Words:",w$
4030 IF LEN w$>32 OR w$="" THEN
 GO TO 4020
4040 PRINT w$
4050 INPUT "X stretch:",x1
4060 IF x1<0 OR x1>31 OR x1<>INT
 x1 THEN  GO TO 4050
4065 IF x1*LEN w$>31 THEN  GO TO
 5000
4070 PRINT ''"X stretch:",x1
4080 INPUT "Y stretch:",y1
4090 IF y1<0 OR y1>21 OR y1<>INT
 y1 THEN  GO TO 4080
4091 INPUT "INK:";in: IF in<0 OR
 in>7 THEN  GO TO 4091
4095 PRINT ''"Y stretch:",y1
4110 INPUT "Where X (0-31)?",wx
4120 IF wx<0 OR INT wx<>wx OR wx
>31 THEN  GO TO 4110
4125 IF x1*LEN w$+wx>31 THEN  GO
 TO 7000
4130 INPUT "Where Y (0-21)?",wy
4140 IF wy<0 OR INT wy<>wy OR wy
>21 THEN  GO TO 4130
4145 IF y1+wy>21 THEN  GO TO 700
0
4150 PRINT "AT ";wx;" , ";wy
4155 LET wy=wy*8: LET wx=wx*8
4160 LET co=co+1
4170 LET a$(co)=w$: LET x(co)=x1
: LET y(co)=y1
4175 LET i(co)=in
4180 LET w(co)=wx: LET v(co)=wy
4181 INPUT "SLOPING left,normal
or right?   (l,n,r):",e$
4182 IF e$="L" OR e$="l" THEN  L
ET d$(co)="l": GO TO 4190
4183 IF e$="R" OR e$="r" THEN  L
ET d$(co)="r": GO TO 4190
4184 IF e$="N" OR e$="n" THEN  L
ET d$(co)="n": GO TO 4190
4190 GO SUB 6000:
4195 POKE 23659,1: PRINT AT 22,0
;"Press a key...": POKE 23659,2
4196 PAUSE 0: CLS : RETURN
5000 CLS
5010 LET Z$="        SUMMARY OF COM
MANDS:        "
5020 PRINT AT 0,0;z$; INK 9; BRI
GHT 1;''''"1 SAVE PICTURE"
5030 PRINT ''''" This will DRAW
words and then  ask you for the
name that you   wish the picture
 to be SAVEd     under (1 TO 10 C
HARS).           The picture can
 be LOADed using"; BRIGHT 1;"LOA
D "" SCREEN$ "
5040 PAUSE 0: CLS
5050 PRINT AT 0,0;z$; INK 9; BRI
GHT 1;''''"2 COPY PICTURE"
5060 PRINT ''''" This will enabl
e you to COPY   the picture on t
o a PRINTER,     when the compute
r has drawn it."
5070 PAUSE 0: CLS
5100 PRINT AT 0,0;z$; INK 9; BRI
GHT 1;''''"3 CLEAR screen"
5110 PRINT ''''" When this numbe
r is pressed youwill be asked to
 confirm this.   Answering ~N~ wi
ll return you tothe MENU. When a
nswering ~Y~ youwill loose all p
revious writing.You then can cho
ose a new colourscheme."
5120 PAUSE 0: CLS
5150 PRINT AT 0,0;z$; INK 9; BRI
GHT 1;''"4 PRINT on screen"
5160 PRINT ''" On ENTERing this
you will be     asked for the lett
ers that you    wish to be printed
 (1 TO 31).      The ~X STRETCH?~
is asking you to ENTER how many
times the       length of the char
acters is       increased (~Y STRE
TCH?~ is the    same but upwards.)
"
5170 PRINT " When you are asked
~WHERE X~       you must enter how m
any places      from the left will p
rinting         start, and ~WHERE Y~
 is the samebut from the bottom
upwards."
5180 PRINT " In all cases of the
 writing        going to go off the
screen you   will be informed and
 returned tothe MENU."
5190 PAUSE 0: CLS
5200 PRINT AT 0,0;z$; INK 9; BRI
GHT 1;''"6 SAVE program"
5210 PRINT ''''" This will SAVE
you a copy of    CHARSIZE, which
can be LOADed    using "; BRIGHT
1;"LOAD ""CHARSIZE"""
5220 PAUSE 0: CLS : RETURN
5999 STOP
6000 CLS : FOR c=1 TO co: LET sp
=0
6010 FOR n=1 TO 32
6020 IF a$(c)(n TO n)=" " THEN
LET sp=sp+1: GO TO 6040
6030 LET sp=0
6040 NEXT n
6050 LET len=32-sp
6070 PRINT AT 21,0;"
6080 PRINT AT 21,0;a$(c)( TO len
)
6085 INK i(co)
6090 FOR f=1 TO len*8
6100 FOR n=0 TO 7
6105 IF d$(c)="l" THEN  LET b=-n
6106 IF d$(c)="r" THEN  LET b=n
6107 IF d$(c)="n" THEN  LET b=0
6110 IF POINT (f-1,n)=0 THEN  GO
 TO 6180
6120 LET px=f*x(c)+w(c)+b
6130 LET py=n*y(c)+v(c)
6140 LET dx=(f+1)*x(c)+w(c)+b
6150 FOR g=1 TO y(c)
6160 PLOT px,py+g
6170 DRAW dx-px-1,0: NEXT g
6180 NEXT n: NEXT f
6190 INK 9: NEXT c
6195 RETURN
7000 CLS : PRINT "Printing will
go off Screen.": PAUSE 0: RETURN

9000 CLS : PRINT AT 9,0;"Press A
NY key to SAVE program..."
9010 PAUSE 0: CLS
9020 PRINT AT 9,0;"SAVEing   ""CH
ARSIZE"""
9030 SAVE "CHARSIZE" LINE 1
9040 CLS : PRINT AT 9,0;"Press A
NY key to VERIFY program."
9050 PAUSE 0: CLS
9060 PRINT AT 9,0;"VERIFYing   ""
CHARSIZE"""''
9065 VERIFY "CHARSIZE"
9070 CLS : GO TO 65
```

SAVE IT



WHEN YOU see your electricity bill, have you ever wondered what appliances caused it to be so large? **Save It** by Dirk Gray from London allows you to calculate the cost of running any appliance for a given length of time. You are required to INPUT the time used, the wattage of the appliance, and the cost of electricity per unit. If you do not know the wattage then you can INPUT the voltage of the appliance and the current in amps printed on the fuse. The program runs on the 16K Spectrum.

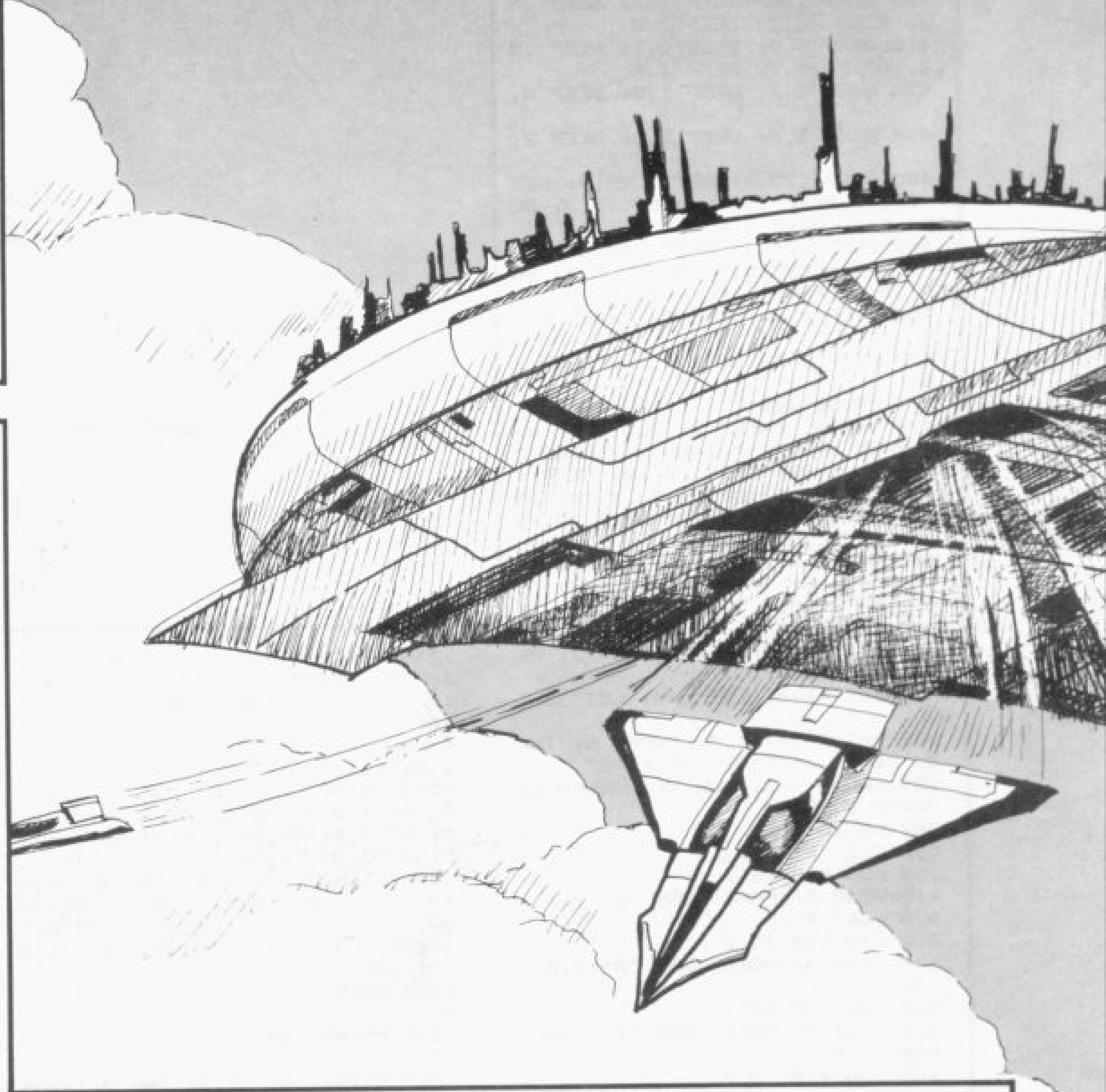
```
   5 REM PROGRAM TO CALCULATE
THE COST OF RUNNING AN ELECTRI-
CAL APPLIANCE FOR A CERTAIN
AMOUNT OF TIME
  10 CLS : INK 0: PAPER 7
  20 INPUT "PRESS KEY 'N' IF THE
APPLIANCE  DOES NOT STATE IT'S
WATTAGE ";n$
  30 IF n$="n" OR n$="N" THEN  G
O TO 160
  40 INPUT "PLEASE ENTER THE WAT
TAGE OF THE APPLIANCE ";w
  50 INPUT "PLEASE ENTER THE AMO
UNT OF TIME THE APPLIANCE HAS BE
EN USED FOR IN MINUTES ";m
  60 INPUT "PLEASE ENTER THE COS
T PER UNIT  OF ELECTRICAL ENERGY
 IN PENCE ";p
  70 LET a=w/100
  80 LET b=m/60
  90 LET c=p/100
 100 LET d=a*b*c
 110 PRINT "COST=£";d
 120 PRINT AT 11,2;"PRESS KEY 'Y
' FOR ANOTHER GO"
 130 INPUT y$
 140 IF y$="Y" OR y$="y" THEN  G
O TO 10
 150 STOP
 160 INPUT "PLEASE ENTER THE CUR
RENT (AMPS) OF THE APPLIANCE ";i
 170 INPUT "PLEASE ENTER THE VOL
TAGE (VOLTS)OF THE APPLIANCE ";v
 180 LET w=i*v
 190 GO TO 50
```

THE RIGHT STUFF

THE ALIENS are back in force; the safety of democracy as we know it is in your hands. You must shoot down the alien ships, then board the mothership and break a code. If you win through to the end you will get a shot at destroying the alien home planet.

The Right Stuff was written for the 48K Spectrum and uses special graphics characters. Please read the instructions at the beginning of Program Printout before entering these.

We would be grateful if the author of The Right Stuff would contact us as soon as possible.

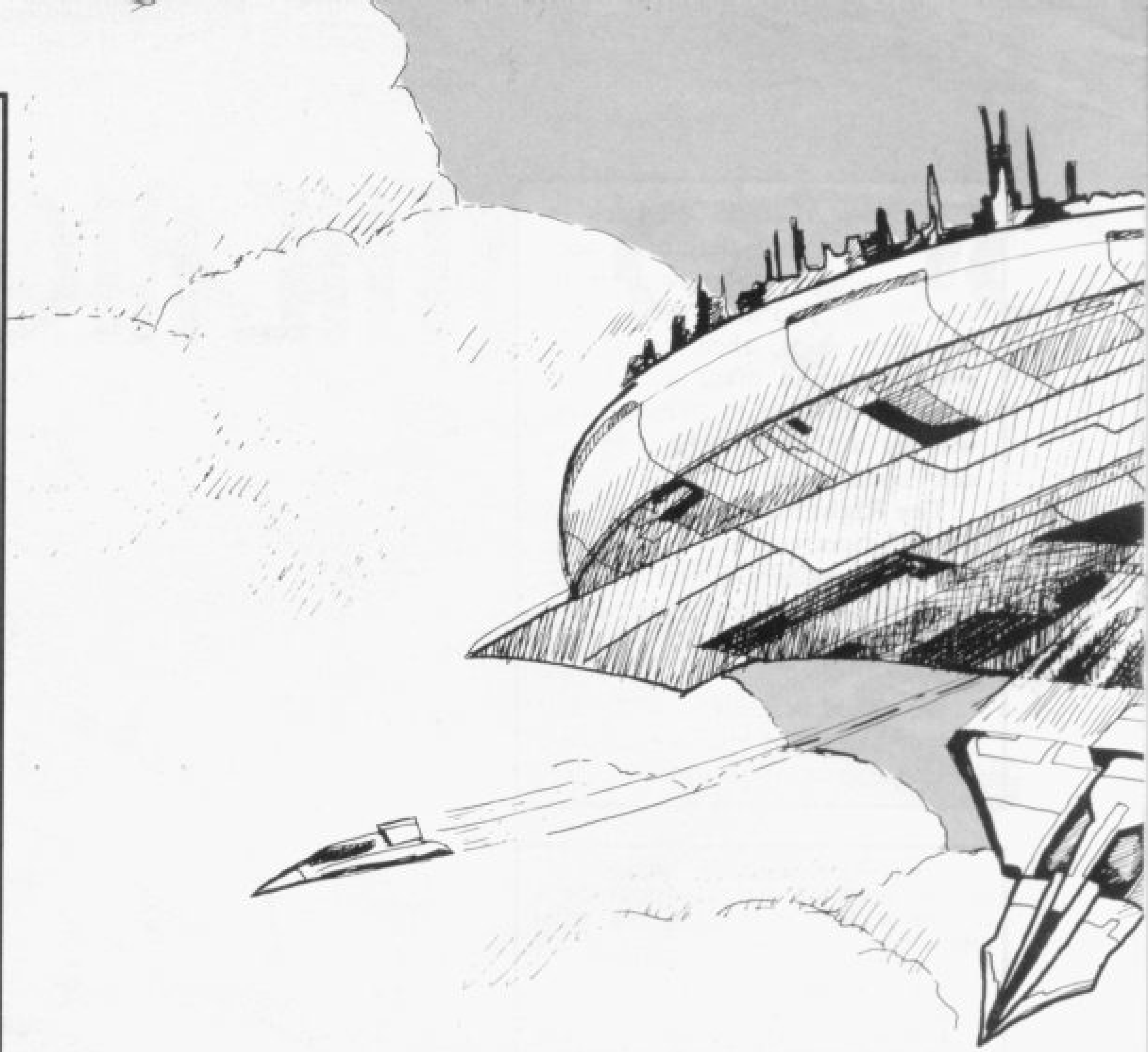


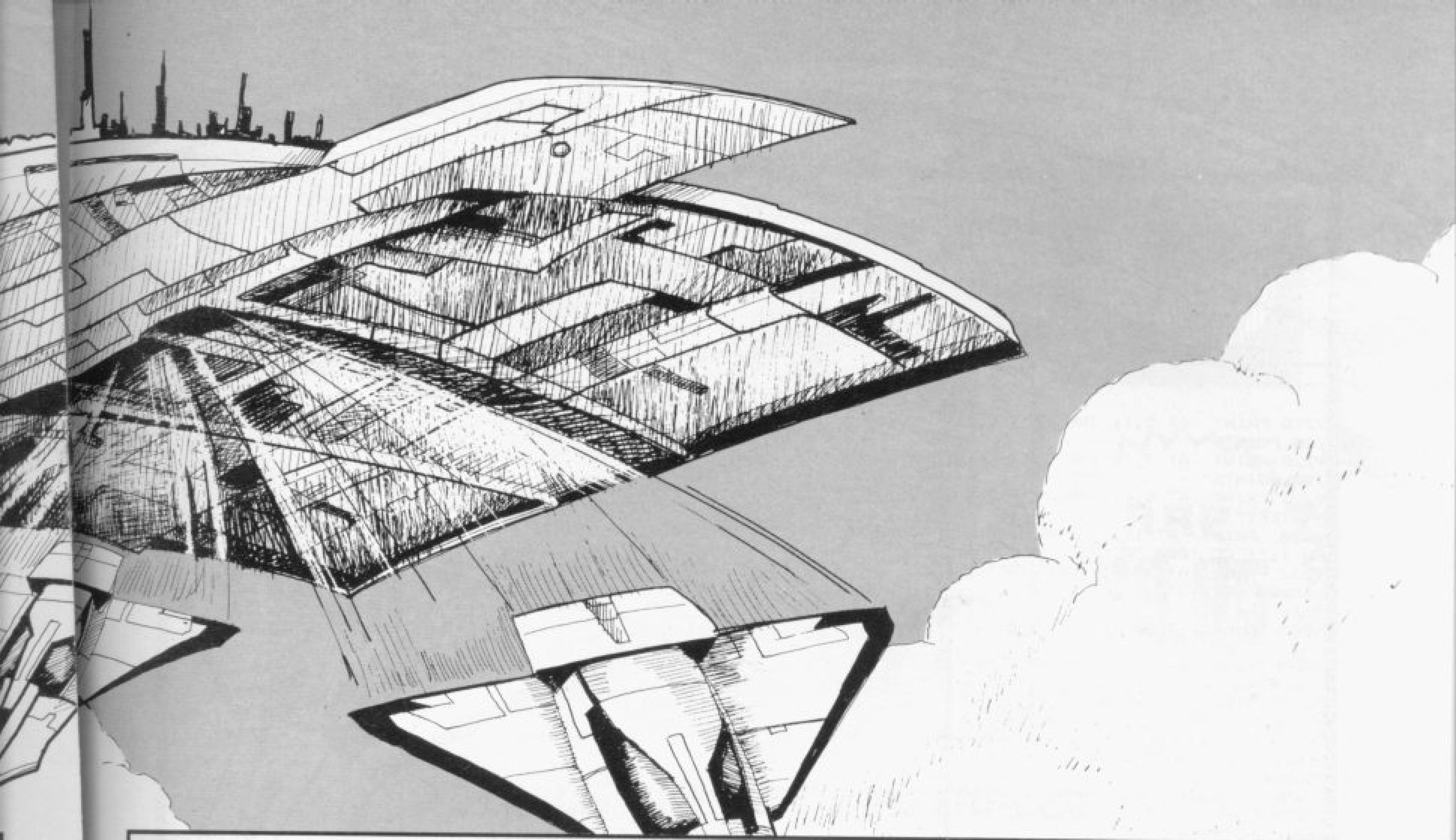
```
   2 PRINT "(2*sp)THE OBJECT
OF THE GAME IS TO(2*sp)DESTROY A
LL THE ALIENS DEFENDING THE MOTH
ERSHIP"
   3 LET z$="......"
   4 LET hi=0: LET pla=0
   5 IF hi<1 THEN  GO TO 7
   6 CLS : PRINT "(2*sp)THE OBJE
CT OF THE GAME IS TO(2*sp)DESTRO
Y ALL THE ALIENS DEFENDING THE M
OTHERSHIP"
   7 PRINT "THE HI-SCORE IS ";hi
;" BY ";z$: PAUSE 0
   8 CLS : PRINT "Get ready": PA
USE 100
   9 LET oq=0: LET beep=0: LET a
dd=0: LET bonus=0: LET lives=5
  10 BORDER 6: PAPER 0: CLS
  11 LET pig= INT ( RND *4)
  12 LET cragpig=0
  15 LET aliens=0: LET onc=0
  20 LET q=0
  21 LET jon=4
  22 PRINT  AT 21,13; INK 7;"LIV
ES ";lives
  26 LET c=10
  27 LET y=5
  30 LET n=0
  40 LET r= INT ( RND *10)
  45 LET big= INT ( RND *25)
  47 LET snort= INT ( RND *10)
  50 LET plus= INT ( RND *1000)
  60 INK 6
  70 LET a= INT ( RND *21)
  73 IF onc=1 THEN  GO TO 80
  75 IF q >= 14000 AND pla=0 THE
N  GO TO 9500
  80 IF r=3 THEN  INK 4
  81 IF snort=6 THEN  INK 7: LET
 cragpig=1
  82 IF big=15 THEN  INK 5
  85 IF r=3 THEN  LET y=20
  86 IF snort=6 THEN  LET y=10
  87 IF big=15 THEN  LET y=25
  90 FOR b=0 TO 28
  95 LET jon=4
 100 IF q >= oq+1500+plus THEN
GO TO 1500
 101 IF q<3000 OR q>9995 THEN  G
O TO 104
 102 LET piggy= INT ( RND *10):
IF piggy=7 THEN  LET add=1
 103 IF piggy <> 7 THEN  LET add
=0
 105 IF q>10000 THEN  LET bonus=
bonus+1
 106 IF q>10000 THEN  LET add=1
 107 IF bonus=1 THEN  LET lives=
lives+1: PRINT  AT 10,12; INK 6;
 FLASH 1; BRIGHT 1;"BONUS": LET
beep=-0.002: BEEP .2,-5: BEEP .1
,0: BEEP .2,-5: BEEP .2,-5: BEEP
 .1,0: BEEP .2,-5: CLS : GO TO 1
20
 110 IF q >= 1500 THEN  GO TO 12
0
 115 GO TO 130
 120 FOR b=0 TO 28 STEP 2
 121 IF add=0 THEN  GO TO 125: L
ET pig= INT ( RND *4)
 122 LET pig= INT ( RND *4): IF
a=20 THEN  GO TO 124
 123 IF pig>2 THEN  LET a=a+1
 124 IF pig <= 2 THEN  LET a=a-1
 125 LET y=10
 127 LET jon=4
 130 LET d=28
 140 PRINT  AT c,d; INK 5;"B"
 170 IF c=0 THEN  GO TO 185
 180 IF  INKEY$ ="9" THEN  LET c
=c-1
 185 IF c=20 THEN  GO TO 191
 190 IF  INKEY$ ="1" THEN  LET c
=c+1
 191 IF cragpig=1 THEN  PRINT  A
T a,b;"F": BEEP 0.005,y
 192 IF cragpig=1 THEN  GO TO 19
6
 194 PRINT  AT a,b;"I": BEEP 0.0
05-beep,y
 196 PRINT  AT 0,0;"(5*sp)"
 200 IF b >= 28 THEN  LET q=q-25
 210 PRINT  AT 21,0; INK 7;"SCOR
E ";q
 220 PRINT  AT 21,13; INK 7;"LIV
ES ";lives
 225 PRINT  AT 21,21; INK 7;"(2*
sp)HITS ";aliens
 230 PRINT  AT c+1,d;"(sp)"
 240 PRINT  AT c-1,d;"(sp)"
 245 IF c+1>29 THEN  LET c=c-1
 250 PRINT  AT a,b;"(sp)"
 255 IF  INKEY$ ="0" THEN  PRINT
  AT c,d-10; INK 6;"CCCCCCCCCC":
 BEEP .075,-5: PRINT  AT c,d-10;
"(10*sp)": LET q=q-5
 260 IF  INKEY$ ="0" AND a=c AND
 b >= 17 THEN  PRINT  AT a,b; IN
K 2+cragpig;"D": BEEP .1,1: BEEP
 .1,-5: BEEP .1,1: BEEP .1,-5: L
ET q=q+100: LET aliens=aliens+1:
 GO SUB 300
 270 IF b=28 THEN  GO TO 300
 280 NEXT b
 285 LET cragpig=0
 290 GO TO 150
 300 IF b >= 28 THEN  LET lives=
lives-1
 301 LET cragpig=0
 302 IF q<3000 OR q>9995 THEN  G
O TO 310
 310 IF lives=0 THEN  PRINT  AT
21,19; INK 7;"0": IF lives=0 THE
N  GO SUB 400
 312 CLS
 315 IF lives=0 THEN  GO SUB 400
 320 IF b >= 28 THEN  GO TO 25
 322 IF big=15 THEN  LET q=q+905
 325 IF big=15 THEN  GO TO 350
 330 IF r=3 THEN  LET q=q+100
 340 IF snort=6 THEN  LET q=q+ I
```

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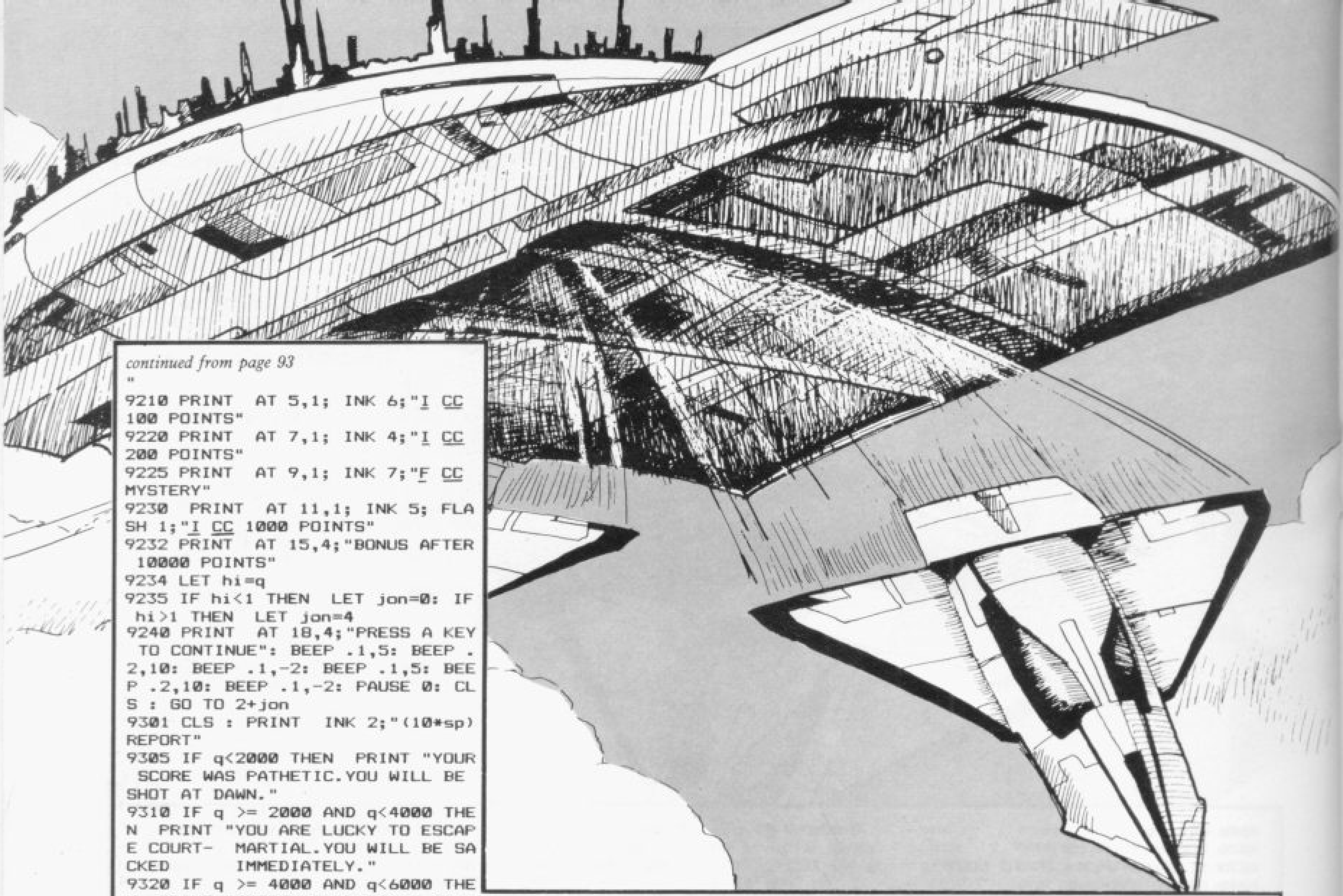
```
NT ( RND *400)+100
 350 CLS
 355 LET cragpig=0
 360 GO TO 25
 400 PAUSE 100
 401 CLS
 402 IF lives=0 THEN  PRINT  INK
 7;"(3*sp)YOU HAVE BEEN DESTROYE
D.(6*sp)YOU SCORED ";q;" POINTS
AND(11*sp)DESTROYED ";aliens;" A
LIENS"
 405 BEEP 1,0: BEEP 1,2: BEEP .5
,3: BEEP .5,2: BEEP 1,0
 410 BEEP 1,0: BEEP 1,2: BEEP .5
,3: BEEP .5,2: BEEP 1,0
 420 BEEP 1,3: BEEP 1,5: BEEP 2,
7
 430 BEEP 1,3: BEEP 1,5: BEEP 2,
7
 440 BEEP .75,7: BEEP .25,8: BEE
P .5,7: BEEP .5,5: BEEP .5,3: BE
EP .5,2: BEEP 1,0
 450 BEEP .75,7: BEEP .25,8: BEE
P .5,7: BEEP .5,5: BEEP .5,3: BE
EP .5,2: BEEP 1,0
 460 BEEP 1,0: BEEP 1,-5: BEEP 2
,0
 470 BEEP 1,0: BEEP 1,-5: BEEP 2
,0
 475 PAUSE 200
 477 INK 0: PAPER 7: CLS : IF q>
hi THEN  PRINT "A NEW HI-SCORE!"
: BEEP .1,20: BEEP .2,10: BEEP .
1,20: BEEP .1,15: BEEP .1,10: BE
EP .2,20: BEEP .1,20: BEEP .2,10
: BEEP .1,20
 478 IF q>hi THEN  GO TO 9090
 479 IF q<hi THEN  GO TO 9031
 480 GO TO 510
 490 CLS : PAPER 0: BORDER 0: PR
INT  AT 5,12; PAPER 6; INK 2; FL
ASH 1;"ATTACK"
 495 LET hi=0: LET q=0: LET jon=
0
 500 PRINT  AT 7,8; PAPER 5; INK
 0; FLASH 1;"STOP THE TAPE"
 505 PAUSE 125: INK 7: BORDER 6:
 PAPER 0: CLS
 507 GO TO 600
 510 CLS
 600 FOR f=0 TO 7
 610 READ A: POKE  USR "I"+f,A
 620 NEXT f
 630 FOR F=0 TO 7
 640 READ A: POKE  USR "A"+f,A
 650 NEXT f
 660 FOR f=0 TO 7
 670 READ A: POKE  USR "B"+f,A
 680 NEXT f
 685 FOR f=0 TO 7
 690 READ A: POKE  USR "C"+f,A
 695 NEXT f
 700 FOR f=0 TO 7
 710 READ A: POKE  USR "D"+f,A
 720 NEXT f
 730 FOR f=0 TO 7
 740 READ A: POKE  USR "G"+f,A
 750 NEXT f
 760 FOR f=0 TO 7
 770 READ A: POKE  USR "F"+f,a
 780 NEXT f
 906 CLS
1000 DATA 0,60,90,60,60,66,36,0
1111 DATA 0,36,66,60,60,90,60,0
1200 DATA 3,7,30,126,126,30,7,3
1250 DATA 0,0,0,0,255,0,0,0
1260 DATA 36,91,69,42,222,67,54,
43
1270 DATA 0,0,7,255,255,7,0,0
1300 CLS : LET hi=0: GO TO 9200
1500 INK 7: PAPER 0: BORDER 5: C
LS
1505 DATA 0,24,126,219,126,24,0,
0
1510 PRINT "YOU HAVE DESTROYED A
LL ALIENS.  YOU MUST NOW SOLVE T
HE CODE.     DOCKING MANDEUVRES A
RE AUTOMATIC"
1520 PRINT "PRESS A KEY TO BEGIN
 DOCKING."
1530 PAUSE 0
1540 CLS
1550 FOR n=30 TO 1 STEP -1
1551 PRINT  AT 10,1; INK 7;"(ig8
)": INK 2: PRINT  AT 14,0;"(ig8,
ig4)": PRINT  AT 6,0;"(ig8,ig1)"
; AT 7,0;"(2*ig8)"; AT 8,0;"(2*i
g8)"; AT 9,0;"(2*ig8)"; AT 10,0;
"(ig8)"; AT 11,0;"(2*ig8)"; AT 1
2,0;"(2*ig8)"; AT 13,0;"(2*ig8)"
1553 PRINT  AT 0,0; INK 2;"(ig8)
"; AT 1,0;"(ig8)"; AT 2,0;"(ig8)
"; AT 3,0;"(ig8)"; AT 4,0;"(ig8)
"; AT 5,0;"(ig8)"
1554 PRINT  AT 15,0; INK 2;"(ig8
)"; AT 16,0;"(ig8)"; AT 17,0;"(i
g8)"; AT 18,0;"(ig8)"; AT 19,0;"
(ig8)"; AT 20,0;"(ig8)"; AT 21,0
;"(ig8)"
1555 PRINT  AT 9,2; INK 2;"(ig1)
"
1556 PRINT  AT 10,2; INK 2;"(ig8
)"
1557 PRINT  AT 11,2; INK 2;"(ig4
)"
1560 PRINT  AT 10,n; INK 5;"B "
1570 BEEP .2,3
1580 NEXT n
1590 PAUSE 50: PRINT  AT 10,2; I
NK 2;"(ig8)": PAUSE 50: CLS
1600 GO TO 2000
1900 CLEAR
2000 DATA 1,2,3,4,5,6
2010 BORDER 5: PAPER 7: INK 0: C
LS
2020 PRINT "PART II CODE BREAKER
"
2030 PRINT "WOULD YOU LIKE TO OM
IT THE MAIN INSTRUCTIONS?(y or n
)"
2040 INPUT a$: IF a$="y" OR a$="
Y" OR a$="" THEN  GO TO 2070
2050 IF a$="n" OR a$="N" THEN  G
O TO 2060
2060 PRINT  AT 1,0;"(61*sp)"
2062 PRINT  AT 1,0;"INSTRUCTIONS
": PRINT "   The object of this
section      is to break the code
 on the     mothership which will
 activate the self destruct mech
anism.    At first the computers
 will onlybe on ALERT,but after
you have  destroyed about two mo
therships the computers will be
on FULL    ALERT.
              When the computer
is at FULLALERT then at the end
of each go(there are six in all)
 the       computer will only ind
icate       the choices which are
totally     correct whereas when o
n ALERT     the computer will show
 either a black or a green aster
isk."
2063 PAUSE 0: FOR n=2 TO 21: PRI
NT  AT n,0;"(32*sp)": NEXT n
2064 PRINT  AT 2,0;"A black aste
risk shows that the colour that
you have chosen in  the position
 indicated is        totally corr
ect.A green asteriskshows that o
ne of the colours    that you hav
e chosen should be  put where sh
own to be correct."
2065 PRINT "        To enter a col
our you mustpress the key with t
he            appropriate colour a
bove and      then press ENTER.Aft
er you have entered six colours
either blackor green asterisks w
ill appear  giving clues as to t
he correct  combination.": PRINT
"PRESS A KEY TO CONTINUE"
2066 PRINT
2067 PRINT  INK 2;"P.S.IF YOU FA
IL YOU WILL LOSE A(13*sp)LIFE":
PAUSE 0
2070 FOR n=1 TO 21: PRINT  AT n,
0;"(32*sp)": NEXT n
2075 IF a$="n" OR a$="N" THEN  G
O TO 2085
2080 PRINT  AT 2,0;"The object o
f this section is tostart the ex
plosion sequence on the mothersh
ip by solving the    computer acc
ess code."
2082 PAUSE 0
2085 LET j=0
2090 IF q>4000 THEN  LET j=1
3005 BRIGHT 0
3010 FOR n=1 TO 18: PRINT  AT n,
0; INK 7;"(32*sp)": NEXT n
3020 LET natwest=1
3030 LET a= INT ( RND *8)
3040 LET x= INT ( RND *8)
3050 LET y= INT ( RND *8)
3060 LET aa= INT ( RND *8)
3070 LET ssd= INT ( RND *8)
3080 PRINT  AT 2,14;"1"; AT 2,16
;"2"; AT 2,18;"3"; AT 2,20;"4";
AT 2,22;"5"
3090 GO TO 4020
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4000 NEXT g
4020 FOR g=3 TO 15 STEP 2
4030 IF g=15 THEN  GO TO 5080
4040 PRINT  AT 3,0;"1"
4042 PRINT  AT 5,0;"2"
4044 PRINT  AT 7,0;"3"
4046 PRINT  AT 9,0;"4"
4048 PRINT  AT 11,0;"5"
4050 PRINT  AT 13,0;"6"
4060 INPUT bb: IF bb<0 OR bb>8 T
HEN  GO TO 4060
4070 PRINT  AT g,2; BRIGHT 1; IN
K bb;"(ig8)"
4080 INPUT cc: IF cc<0 OR cc>8 T
HEN  GO TO 4080
4090 PRINT  AT g,4; BRIGHT 1; IN
K cc;"(ig8)"
5000 INPUT dd: IF dd<0 OR dd>8 T
HEN  GO TO 5000
5010 PRINT  AT g,6; BRIGHT 1; IN
K dd;"(ig8)"
5020 INPUT ee: IF ee<0 OR ee>8 T
HEN  GO TO 5020
5030 PRINT  AT g,8; BRIGHT 1; IN
K ee;"(ig8)"
5040 INPUT zx: IF zx<0 OR zx>8 T
HEN  GO TO 5040
5050 PRINT  AT g,10; BRIGHT 1; I
NK zx;"(ig8)"
5060 DATA 1,2,3,4,5,6,7,8,9,10
5070 GO TO 6030
5080 PRINT "BAD LUCK!The answer
was:"; INK a; BRIGHT 1;"(ig8)";
INK x; BRIGHT 1;"(ig8)"; INK y;
BRIGHT 1;"(ig8)"; INK aa; BRIGHT
 1;"(ig8)"; INK ssd; BRIGHT 1;"(
ig8)": GO TO 9030
5090 LET a$= INKEY$
6000 INPUT a$
6010 IF a$="y" THEN  RUN : IF  L
EN a$ <> 1 THEN  GO TO 6000
6020 STOP
6030 IF j=1 THEN  GO TO 6060
6040 IF bb <> a OR cc <> a OR dd
 <> a OR ee <> a OR zx <> a THEN
  PRINT  AT g,14;"(sp)"
6050 IF cc=a OR dd=a OR ee=a OR
zx=a AND bb <> a THEN  PRINT  AT
 g,14; INK 4;"*"
6060 IF bb=a THEN  PRINT  AT g,1
4; INK 0;"*"
6070 IF j=1 THEN  GO TO 7000
6080 IF bb <> x OR cc <> x OR dd
 <> x OR ee <> x OR zx <> x THEN
  PRINT  AT g,16;"(sp)"
6090 IF bb=x OR dd=x OR ee=x OR
zx=x AND cc <> x THEN  PRINT  AT
 g,16; INK 4;"*"
7000 IF cc=x THEN  PRINT  AT g,1
6; INK 0;"*"
7010 IF j=1 THEN  GO TO 7040
7020 IF bb <> y OR cc <> y OR dd
 <> y OR ee <> y OR zx <> y THEN
  PRINT  AT g,18;"(sp)"
7030 IF bb=y OR cc=y OR ee=y OR
zx=y AND dd <> y THEN  PRINT  AT
 g,18; INK 4;"*"
7040 IF dd=y THEN  PRINT  AT g,1
8; INK 0;"*"
7050 IF j=1 THEN  GO TO 7080
7060 IF bb <> aa OR cc <> aa OR
dd <> aa OR ee <> aa OR zx <> aa
 THEN  PRINT  AT g,20;"(sp)"
7070 IF bb=aa OR cc=aa OR dd=aa
OR zx=aa AND ee <> aa THEN  PRIN
T  AT g,20; INK 4;"*"
7080 IF ee=aa THEN  PRINT  AT g,
20; INK 0;"*"
7090 IF j=1 THEN  GO TO 8020
8000 IF bb <> ssd OR cc <> ssd O
R dd <> ssd OR ee <> ssd OR zx <
> ssd THEN  PRINT  AT g,22;"(sp)
"
8010 IF bb=ssd OR cc=ssd OR dd=s
sd OR ee=ssd AND zx <> ssd THEN
 PRINT  AT g,22; INK 4;"*"
8020 IF zx=ssd THEN  PRINT  AT g
,22; INK 0;"*"
8030 IF bb=a AND cc=x AND dd=y A
ND ee=aa AND zx=ssd THEN  PRINT
 AT 18,10; INK 6; PAPER 1; FLASH
 1;"WELL DONE!": FOR d=-50 TO 50
: BEEP .05,d: NEXT d: GO TO 9010
8035 LET natwest=natwest+1
8040 GO TO 4000
8050 FOR n=1 TO 18: PRINT  AT n,
0;"(32*sp)": NEXT n
9000 GO TO 2090
9010 CLS : PRINT "EXPLOSION SEQU
ENCE ACTIVATED!"
9011 FOR n=0 TO 30
9012 LET qwer= INT ( RND *7): BO
RDER qwer
9013 BEEP .2,n
9014 NEXT n
9015 CLS : PRINT "ANOTHER MOTHER
 SHIP APPROACHING": LET q=q+1000
: BEEP 2,45
9016 IF natwest<4 AND j=1 THEN
LET q=q+1000
9017 IF j=1 THEN  LET q=q+1000
9018 LET oq=q
9020 PAPER 7: BORDER 2: INK 0: C
LS : FOR v=5 TO 0 STEP -1
9021: PRINT ; INK 0; AT 0,0;"TIM
E TO VISUAL RANGE ";v: BEEP 0.75
,14
9024 BORDER v
9025 NEXT v
9026 BORDER 6: PAPER 0: CLS
9029 GO TO 22
9030 LET lives=lives-1: PAUSE 0
9035 IF lives=0 THEN  GO TO 477
9036 IF lives>0 THEN  CLS
9037 IF lives>0 THEN  PRINT "YOU
 HAVE FAILED TO SOLVE THE    ACC
ESS CODE.YOU HAVE LOST A LIFE":
LET oq=q
9038 IF lives>0 THEN  PRINT "ANO
THER MOTHER SHIP APPROACHING": B
EEP 4.5,45
9039 IF lives>0 THEN  GO TO 9026
9040 IF lives=0 THEN  PRINT "Wou
ld you like another go?"
9045 INPUT a$
9046 CLS
9047 IF a$="y" THEN  GO TO 9200
9050 IF a$="n" THEN  POKE 23659,
0
9055 IF a$ <> "n" OR a$ <> "y" T
HEN  GO TO 9040
9060 GO TO 22
9100 PRINT "(4*sp)PLEASE ENTER Y
OUR NAME."
9102 PRINT "(7*sp)(8 LETTERS MAX
.)"
9105 LET hi=q
9120 INPUT z$
9122 IF  LEN z$>8 THEN  PRINT  A
T 11,11;"TOO LONG": PAUSE 75: PR
INT  AT 11,11;"(8*sp)": GO TO 91
20
9124 IF z$="" THEN  GO TO 9120
9130 CLS : PRINT  AT 10,8; INK 0
; PAPER 6; FLASH 1;"WELL DONE ";
z$
9140 PAUSE 0: CLS : GO TO 9300
9200 PAPER 0: INK 7: CLS
9201 PRINT  AT 6,20;"9 - UP"; AT
 8,20;"1 - DOWN"; AT 10,20;"0 -
FIRE"
9205 PRINT  AT 2,9;"ALIEN ATTACK
```

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"
9210 PRINT  AT 5,1; INK 6;"I CC
100 POINTS"
9220 PRINT  AT 7,1; INK 4;"I CC
200 POINTS"
9225 PRINT  AT 9,1; INK 7;"F CC
MYSTERY"
9230  PRINT  AT 11,1; INK 5; FLA
SH 1;"I CC 1000 POINTS"
9232 PRINT  AT 15,4;"BONUS AFTER
 10000 POINTS"
9234 LET hi=q
9235 IF hi<1 THEN  LET jon=0: IF
 hi>1 THEN  LET jon=4
9240 PRINT  AT 18,4;"PRESS A KEY
 TO CONTINUE": BEEP .1,5: BEEP .
2,10: BEEP .1,-2: BEEP .1,5: BEE
P .2,10: BEEP .1,-2: PAUSE 0: CL
S : GO TO 2+jon
9301 CLS : PRINT  INK 2;"(10*sp)
REPORT"
9305 IF q<2000 THEN  PRINT "YOUR
 SCORE WAS PATHETIC.YOU WILL BE
SHOT AT DAWN."
9310 IF q >= 2000 AND q<4000 THE
N  PRINT "YOU ARE LUCKY TO ESCAP
E COURT-   MARTIAL.YOU WILL BE SA
CKED       IMMEDIATELY."
9320 IF q >= 4000 AND q<6000 THE
N  PRINT "PRETTY GOOD.DON'T CALL
 US WE'LL CALL YOU."
9330 IF q >= 6000 AND q<8000 THE
N  PRINT "WELL DONE!YOU ARE TO B
E PROMOTEDTO COMMANDER IMMEDIATE
LY.YOU     HAVE DESTROYED OVER 1/
2 OF THE   ENTIRE ALIEN FLEET AND
 HAVE      PREVENTED ANY FURTHER
ALIEN      ATTACK FOR AT LEAST 10
 YEARS."
9340 IF q >= 8000 AND q<10000 TH
EN  PRINT "WELL DONE!YOUR SKILL
HAS SAVED  US FROM ALMOST CERTAI
N          DESTRUCTION AND YOU H
AVE        DESTROYED AT LEAST 3/
4 OF THE   ALIEN FLEET!"
9350 IF q >= 10000 AND q<13000 T
HEN  PRINT "EXCELLENT!YOUR PROMO
TION PAPERS AND MEDAL  ARE ON TH
E WAY.YOU   HAVE RID US OF THE A
LIEN THREAT FOR AT LEAST 5 DECAD
ES.THE PRIMEMINISTER WOULD LIKE
TO          CONGRATULATE YOU IN
PERSON AS   SOON AS YOU HAVE REC
OVERED."
9360 IF q >= 13000 THEN  PRINT "
YOU MAY NOW RETIRE AFTER HAVING
DESTROYED THE ENTIRE ALIEN FLEET
"
9365 IF q >= 13000 THEN  PRINT "
   PLEASE REPORT TO THE PALACE
FOR YOUR CONGRATULATORY SPEECH
FROM HER MAJESTY!"
9366 PAUSE 0
9367 IF q>hi THEN  GO TO 477
9370 GO TO 9040
9440 INK 0: PAPER 7: BORDER 5: C
LS
9460 RETURN
9500 INK 5: PAPER 0: CLS : LET o
q=q
9501 LET pla=1: POKE 23609,110
9502 PRINT "ALL ALIENS AND MOTHE
RSHIPS ARE  DESTROYED YOU MUST N
OW DESTROY  THEIR HOME PLANET YO
U HAVE 15000UNITS OF FUEL!IF YOU
 RUN OUT OF FUEL YOU WILL LOSE Y
OUR CHANCE  TO DESTROY THEIR PLA
NET": PAUSE 0
9503 GO TO 9710
9505 PAUSE 0: CLS
9510 PRINT  INK 7;"(5*sp)THE ALI
EN'S PLANET"
9520 PRINT  AT 11,28; INK 5;"B"
9530 FOR n=0 TO 50
9540 CIRCLE 50,87,n
9545 INK 4
9550 NEXT n
9560 PRINT  INK 7; AT 2,0;"ENTER
 0 TO FIRE MISSILE"
9562 INPUT fi
9565 IF fi <> 0 THEN  GO TO 9560
9570 FOR n=27 TO 12 STEP -1
9580 PRINT  AT 11,n; INK 6;"G(sp
)"
9582 PRINT  AT 11,28;"B"
9584 BEEP .5,12
9590 NEXT n
9592 LET cv=20
9595 FOR n=0 TO 65
9597 LET cv=cv-1
9600 LET fin= INT ( RND *7)
9610 BORDER fin
9615 BEEP .1,fin-cv
9620 NEXT n
9630 BEEP .3,50
9635 INK 7: PAPER 0: CLS
9640 PRINT  AT 11,28; INK 5;"B"
9645 PRINT  AT 0,0;"           WE
LL DONE"
9650 BEEP .1,10: BEEP .2,15: BEE
P .1,13: BEEP .15,14: BEEP .2,23
9660 BEEP .1,10: BEEP .2,15: BEE
P .1,13: BEEP .15,14: BEEP .2,23
9670 BEEP .1,10: BEEP .2,15: BEE
P .1,13: BEEP .15,14: BEEP .2,23
9680 BEEP .2,14: BEEP .24,17
9690 BEEP .2,14: BEEP .24,17: BE
EP .2,10
9700 BORDER 6: CLS : PRINT "ANOT
HER PLANET IS ATTACKING US!": PA
USE 200: CLS : GO TO 22
9705 PAUSE 100: GO TO 22
9710 PAPER 0: INK 7: CLS
9715 LET fu=15000: LET pl= INT (
 RND *20)
9730 PLOT 0,44: DRAW 255,0: PLOT
 0,87: DRAW 255,0: PLOT 0,131: D
RAW 255,0
9760 PLOT 51,0: DRAW 0,175: PLOT
 102,0: DRAW 0,175: PLOT 153,0:
DRAW 0,175: PLOT 204,0: DRAW 0,1
75
9780 PRINT  AT 3,2;"1"; AT 8,2;"
2"; AT 13,2;"3"; AT 18,2;"4": PR
INT  AT 3,8;"5"; AT 8,8;"6"; AT
13,8;"7"; AT 18,8;"8": PRINT  AT
 3,14;"9"; AT 8,14;"10"; AT 13,1
4;"11"; AT 18,14;"12"
9790 PRINT  AT 3,20;"13"; AT 8,2
0;"14"; AT 13,20;"15"; AT 18,20;
"16": PRINT  AT 3,26;"17"; AT 8,
26;"18"; AT 13,26;"19"; AT 18,26
;"20"

9800 LET we=0
9802 FOR n=0 TO 31: PRINT  AT 0,
n; INK 5;"(ig8)": PRINT  AT 1,n;
 INK 5;"(ig8)": NEXT n
9803 FOR n=0 TO 31 STEP 3: PRINT
  AT 20,0;"ENTER DESTINATION"
9804 INPUT des: IF des>20 THEN
GO TO 9805
9805 PRINT  AT 0+we,n; INK 0; PA
PER 5;des;"(sp)"
9806 IF n=30 THEN  LET we=1: IF
n=30 THEN  LET n=0: PRINT  AT 20
,0;"(18*sp)"
9807 LET fu=fu- INT ( RND *1000)

9808 IF fu <= 0 THEN  PAUSE 50:
CLS : PRINT "YOU HAVE FAILED MOR
E ALIENS ARE ATTACKING": BEEP .4
,20: PAUSE 50: CLS : GO TO 22
9809 FOR f=0 TO des: BEEP .175,d
es: NEXT f
9810 PRINT  AT 21,0;"YOU ARE NOW
 AT ";des;" FUEL:";fu
9812 PAUSE 100
9813 PRINT  AT 21,0;"(31*sp)"
9815 IF des=pl THEN  PAUSE 50: C
LS : PRINT  AT 11,8; INK 6; PAPE
R 2; FLASH 1;"YOU'VE FOUND IT!":
 LET q=q+fu: LET oq=q: BEEP .1,3
: BEEP .2,5: BEEP .1,3: BEEP .2,
5: BEEP .2,10: PAUSE 100: GO TO
9505
9820 IF des <> pl THEN  NEXT n
```

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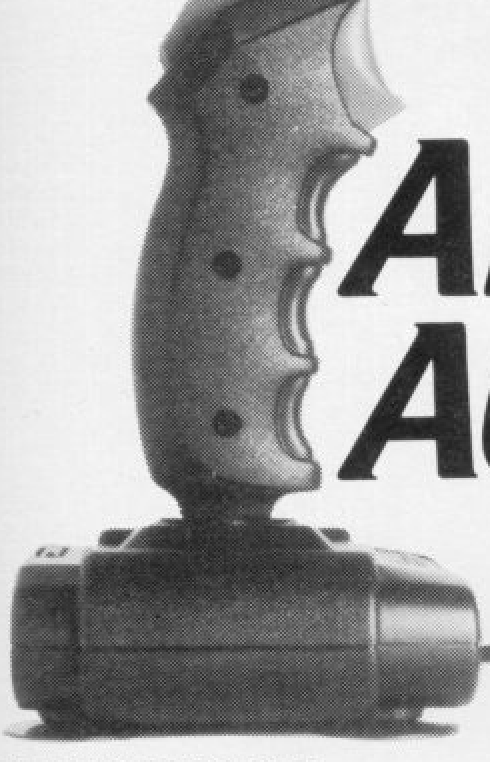
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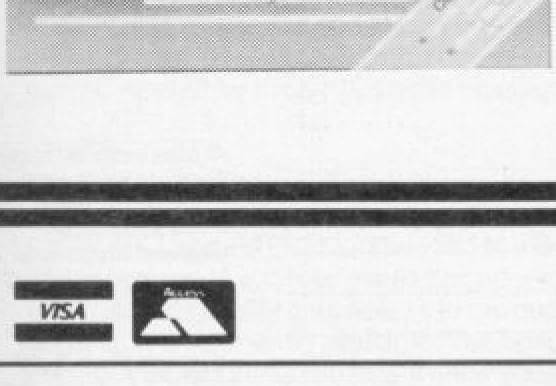
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IT'S A MUG'S GAME

Russel Compe, the Melbourne mob's quick-draw artist, spills the beans to Chris Bourne

MONDAY MORNING. I sat in my office, waiting for a call. A call from the other side of the world, from Melbourne, Australia. A call from a dingy milk bar off Collins Street, from a man I didn't know.

"Talk to him" said the boss. "Get his story." I wasn't sure I wanted to know the story, a story from a city where the sharks in the harbour dine twice weekly on stoolpigeon pie, where good citizens lock themselves in on a Saturday night with a crate of West End and watch old movies. "Who is he?" I asked. The boss looked around, and lowered his voice. "Russel Compe" he rasped. "The man who drew the pix for . . . **Mugsy**".

Mugsy! The name flashed through my brain like a shot of Polish vodka. The story of simple, spaghetti-loving Sicilians which would have been the flop of the year without Russel Compe. Compe, the graphics guy who transformed an ordinary text-only 'land management' game into a smash hit with his atmospheric cartoon pictures and animated sequences.

The phone rang. I picked it up. We talked.

Who was he working for these days? Melbourne House. It figured. Based in Australia, with its major marketing and distribution centres in London and New York, the programmers and designers all worked in Melbourne, Victoria. "How d'ya stay wise to the action?" I asked. "That's a long ways away."

"We can still keep in touch" said Russel. "As long as you believe in what you do, there's little difference. Everyone here is pretty well versed in what's going on."

As we talked, I found out more. His people emigrated to Australia in the last century, to the area around Bendigo in Victoria, where Russel was born.

"What can I say about Bendigo? Born on the gold rush. It's very much a provincial city, with 50,000 people. The buildings are stately — it's a nice sort of city."

His great-grandparents, who were French, came for the gold, and stayed. Russel was schooled there, and took a course in graphic design at the local college. There was never any doubt about his artistic leanings — the kid loved paint.

"From about the age of five I was always playing with pens and paper. When I was older I was thinking about architecture, but at college I wanted to be an artist. An artist has no limits but a smaller audience — when you're a painter, you paint for yourself."

He told me he dropped the notion. The other cats were too self-indulgent, he said. I had to put the phone down to look the word up.

"The obvious thing was to work for advertising agencies and design studios, but there wasn't a great deal of work." The break came a year ago, when Melbourne House advertised for a graphic designer, and hired Russel. Before he got the fix for Mugsy, he worked on **Melbourne Draw** and **HURG** — whatever that was. His boss has faith in his own products — Russel said he used Melbourne Draw to develop the graphics for other programs.

"So tell me, Russel" I asked. "How d'ya do them fancy pictures and all that?" There was a pause on the other end of the line. For a moment, I thought I'd said something wrong.

"When I was first here they weren't sure what was needed" he said. "Now we have draw and fill, stipple effects — it all saves space."

It also meant he could work on programs directly — he said he couldn't write a program himself, not even in Basic. Who can, for gossakes? But he

seemed to like it that way. "I'm not sure what I can and can't do. If you don't know the limits you are always exploring."

I didn't know what he was talking about but he seemed pleasant enough. Time for the big one. How did he get involved in the Mugsy racket?

"The actual script was the only brief I got" he said. "When we saw it it seemed to lend itself to a comic book format, with a different treatment for each frame."

Comics I understood. Read them myself. Apparently Russel was a fan too. "What's your favourite?" I asked. He said he liked The Spirit, by Will Eisner, a comic with gangster stories which had a big influence on Mugsy.

"There's a great similarity between comic and computer art. I don't think people were aware of the potential of computer graphics at first. I like good strong colour in the comic style with contrasts in black and white."

First he had to work out how many pix he could fit into the game. "With the scenes of people talking it was pretty much up to me what I did" he said. "I got pretty involved with recognising cityscapes and waterfront scenes from gangster movies. I tried to see unusual angles and move the scenes outside."

His favourite was the aerial view of two gangsters in a dark street. Maybe you thought those scenes were displayed at random. That is true only when things go well for you. When the heat is on, your henchman Louie will be seen looking kind of pained.

This guy Russel, he made it sound so easy. Even the animation. "We didn't need too much detail but it had to be related to what was going on in the game. The purpose was to set a mood, especially with the speakeasy scene." Speed was the main thing, according to Russel. Getting it right. He said he used a pixel scroll on the limo, the only actual animation was for the wheels. But the overall effect looked real.

The Melbourne mob moved to the south side of town a few months back, and Russel said he liked the city. "It's bigger, there's more to see and do. I'm a city boy, I like the lights and noise." I made some dumb crack about Fosters lager. "I'm a whisky man" he growled. He kept himself in shape, too; played basketball Monday nights for a local team.

I poured another slug of Jack Daniels and lit up a Woodbine — my twentieth of the morning. "What's the buzz on the vine, then Russel? Who are the mob going to hit next?"

He said he'd just finished working over **Sherlock Holmes,** the English shamus with the weird headgear. "A lot of the game is taken up by the logic and text, so the graphics are simpler. We used reference books from the period — Victorian London."

I sweated at the thought of Mugsy's hoods loose in London. But Russel's part in that was over now. His latest operation was **Sports Hero** inspired by the Olympics. He said it would be similar to the arcade game **Hyperolympics** but with three levels — you will have to qualify for the games proper. The graphics were to be large, with eight-stage animation. Sounded like a dame I knew in Birmingham. "I'm pretty happy with them, both the screen-scrolling and the animations" he said. "There should be some interesting games around by Christmas."

He told me you needed a different approach to arcade games from adventures. With adventures, the pictures are only limited by the size of the memory and the story line. Arcade games require that the graphics be an integral part of the structure. "In that case we'll be told what the game's about, what the size limits are, and so on. Animation can be very limited — there was not a lot in **Penetrator.**"

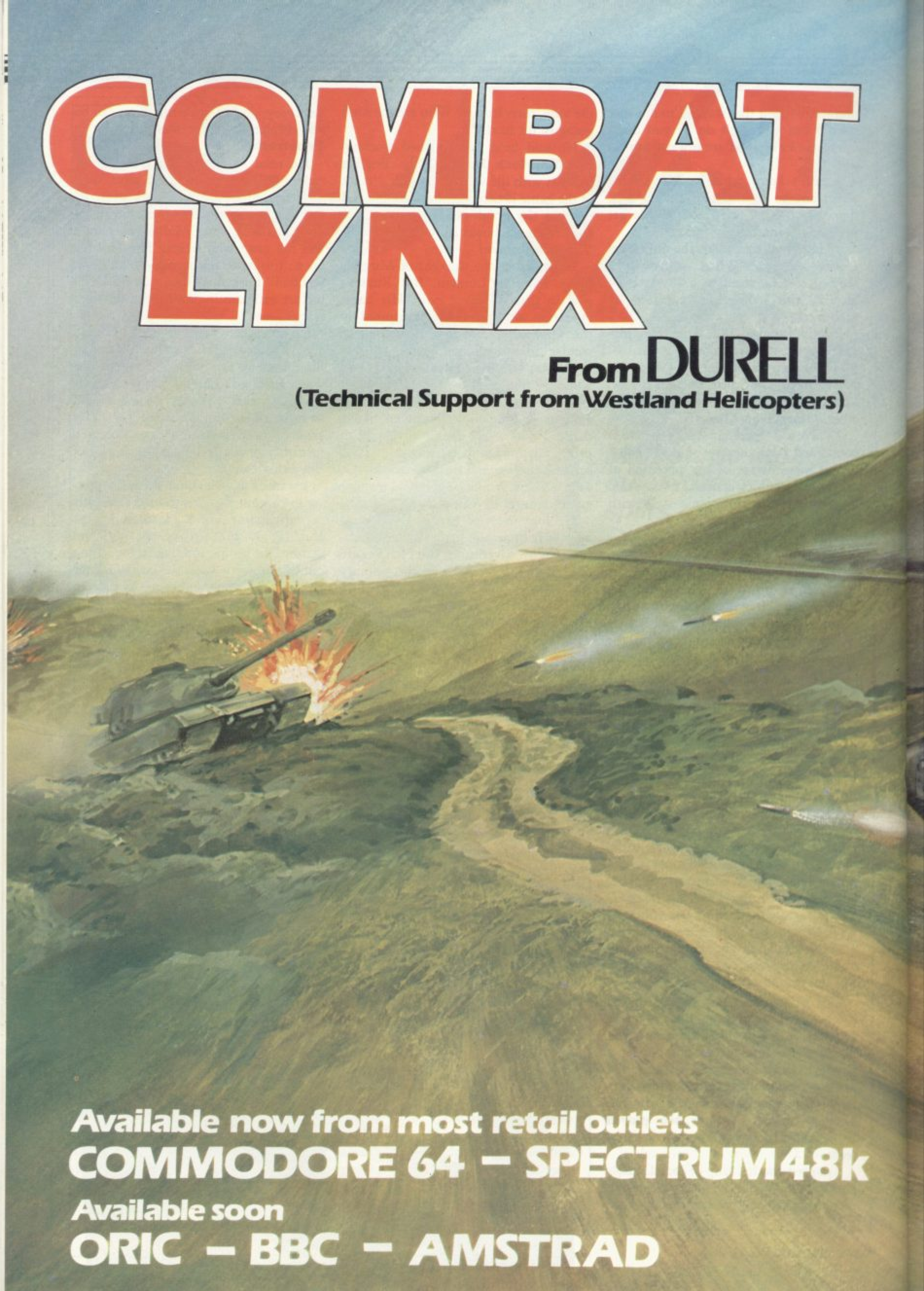
He used to spend hours in the arcades, he said, feeding the slots with quarters. After the mob took over, he leaned towards the adventure racket — not surprising, since Melbourne House was the gang who sicked **The Hobbit** on an unsuspecting world. "Don't you feel bad" I asked, "Giving up on architecture and painting for the old software scam?"

"I don't feel at all limited. There's always some new trick to learn. Look at the things we can do now, compared to when I started. The biggest problem is working with character squares and straight lines. But you can get fairly close using Melbourne Draw. There's a formality about it — it's certainly not like using canvas."

I wanted to talk about Russel's interest in computer-generated art, about his favourite games and his taste in broads. But 12,000 miles away the sun was setting, the pimps and hustlers crawling out of the seamy bars, the coarse stutter of machine guns beginning to play in counterpoint to the sirens of the squad cars. The line went dead. Good luck, Russel. Hope you make it.

Russel on the waterfront




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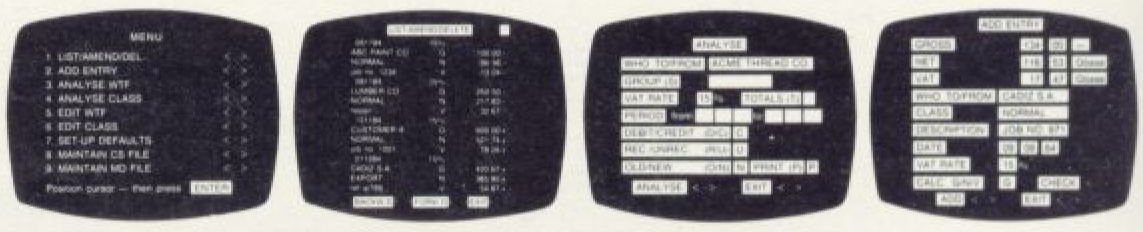
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EASY ACCESS

Interface 1 and the microdrives have been criticized frequently as they are difficult to use. J B Souter shows how to make them flexible friends



THERE IS GOOD NEWS and bad news for Spectrum owners who have upgraded their micros by adding the Sinclair Interface 1 and microdrives. The good news is that several new powerful commands are available. The bad news is that syntax of those commands is both unfriendly and unwieldy.

For example, it takes 22 keystrokes, not counting shift keys, to merge a Basic program which has a 10 character filename. Although the Interface 1 contains an RS232 port to which a serial printer can be connected, the commands "COPY" and "LLIST" which do screendump and listing to the ZX Printer either do not work or require additional commands first. In the case of "LLIST", a subroutine is required as follows:

```
9000 REM: list to printer subroutine, set baudrate first
9010 FORMAT "t" ; baudrate
9020 OPEN #3 ; "t"
9030 LLIST
9040 CLOSE #3
9050 RETURN
```

That gets tedious after a while, so a better solution is needed.

What is required is a set of utilities that can be loaded and accessed easily, which enhance the operating system provided by Sinclair and which can be customised by the user to suit his or her individual needs.

The first requirement is easily met, since Sinclair provided the facility to save one autoloading Basic program on each Microdrive cartridge. That is done by saving the program with the name "run"; the file can then be loaded and run with one keystroke — simply press the RUN key — at power-on or after a complete reset — typing NEW or RANDOMIZE USR. The demonstration cartridge provided with the Microdrive by Sinclair utilises this technique.

My own system grew as I either thought of new things to add, or became irritated with the longwinded syntax, or both. Loading, erasing, merging and producing a cartridge catalogue are the commands used most often and also the ones which require you to hop on and off the shift keys in a very unfriendly manner.

So they were my first choice for a simple utilities system.

A utility to load a program of any sort saves typing

LOAD *"m";1;"... your filename ..."

each time — ten keywords/characters, seven of which require the shift key. The utility is in lines 8000–8099 of Listing 1. A similar utility for erasing a file saves nine keywords/characters, and is given in lines 8700–8799. I will leave file merging until later as that has other implications.

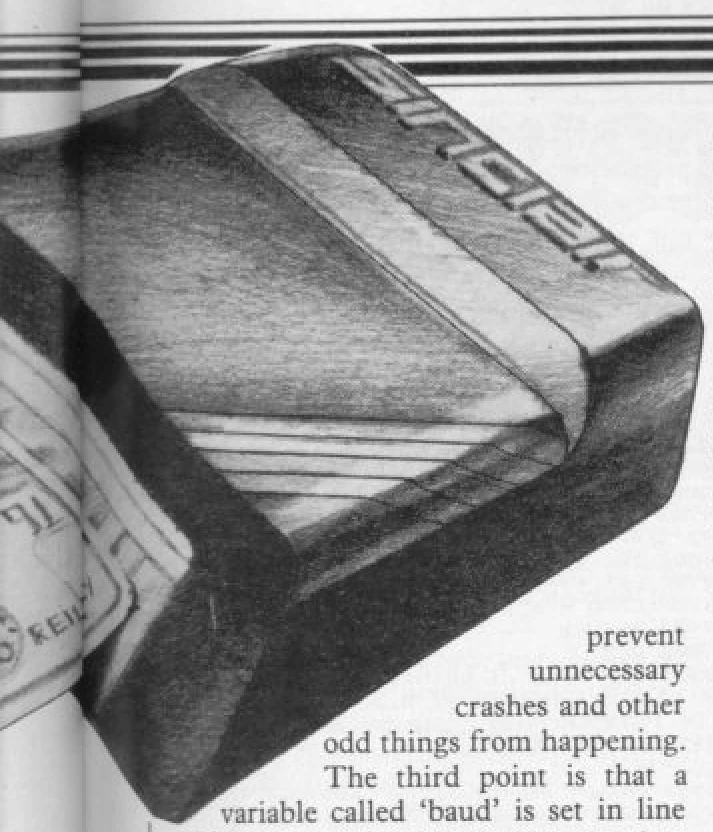
My first catalogue facility simply did a plain CAT 1, which can only display 22 filenames before the SCROLL? prompt appears and consequently a cartridge with many files cannot be catalogued on one screen. Printing a catalogue list requires a stream to be opened, as for the LLIST example given above. Lines 8200–8299 of Listing 1 give a routine which tries to present you with the best of both alternatives; either a simple printed list or a routine called "neat catalogue" from the book *Master Your ZX Microdrive* by Andrew Pennell. The "neat catalogue" routine formats the output on the screen into two filenames per line and adds titles to make it less cryptic. However, the machine-code element of the latter, stored in a microdrive cartridge file called "stream14z$", is missing, as Pennell retains the copyright of this. So you have two choices: either replace lines 8220–8290 by:

8220 CAT 1: PAUSE 0: GOTO origin

or buy the book.

You will have noticed several things about the listing which need explanation. A variable called 'origin' has been used at the end of all the main menu option segments to redirect control to the main menu. That has been done for two reasons of which the most important is flexibility. The variable 'origin' can be reset before calling the segment by a simple LET statement. The second reason is because I have used GOTOs rather than GOSUBs as some routines cannot be RETURNed gracefully. Note that the CLEAR statement at line 7005 will cause 'origin' to lose its value, so always set it to 7010 rather than 7000.

Another point of style concerns the routine at lines 9941–9949 which is used for choosing input options. The routine uses two parameters, 'highest' and 'lowest', which must be defined before calling the routine to ensure that only the required range of numeric keys can be used. All other keys, except BREAK, are inoperative, which should



prevent unnecessary crashes and other odd things from happening.

The third point is that a variable called 'baud' is set in line 7120. That can be altered if your printer will accept a higher baud-rate than mine.

Returning to the main-menu options, an early challenge after I bought the Interface 1 was to link it to my printer via the RS232 port. As my printer is a Tandy Lineprinter VII, that was not a simple task. I ended up experimenting with ways of producing a pixel by pixel screendump. Lines 8300–8399 give a routine which should work with the Seikosha GP80/GP100, the Epson MX80/FX80/RX80 and the ZX Printer.

The Epson routine has been tested on an Epson FX80. The Seikosha routine has not been tested, but as Seikosha makes the Tandy printer and it seems similar in operation, it should work. The ZX Printer version simply uses COPY.

I make no apologies for the appallingly slow speed of the routines, but leave it as an exercise for the reader to produce a quicker version, probably by resorting to machine code.

After a menu asking which printer you have, you will be asked which screen-file you wish to print. Since LINE INPUT has been used, simply pressing the RETURN key will produce a printed version of whatever is on the screen at the time. Otherwise you must give the name of a SCREEN$ type file stored on the cartridge and you will see from the listing that I use a convention here which I have incorporated into the program.

As the catalogue of a cartridge does not distinguish between the various types of file — Basic, code, data — I restrict screen file-names to seven letters and add SCREEN$ to the end of them. SCREEN$ is a token and therefore the suffix is only three characters long. I recommend that you do something similar as that has the additional advantage of performing some validation of the input filename.

The remaining utilities are based on concepts borrowed from Basicode and in a very modest way the idea of programming support environments. The latter concept involves the surrounding of your developing program code with tried and trusted supporting utilities which can then be used either as subroutines for the program or called directly by the programmer. Basicode is a system which enables software written in a subset of common Basics to be broadcast by radio by dedicating certain line numbers to tasks such as clearing the screen, which are handled in different ways by different systems. The Basicode will have lines like GOSUB 10; line 10 must then have the machine specific code — CLS on the Spectrum.

What do these utilities offer? First, the ability to MERGE a Basic program with the auto-run utilities software — see lines 8100–8199. Once MERGEd, the program can be run with the support of the utilities, provided care is taken not to use line numbers greater than 7000, where the utilities are. Then, if a screen dump is required, that can be done by calling the utility in lines 8300–8399; return is achieved by setting the value of the variable "origin" to the following line number in your code.

For example:

```
440 . . . your program code . . .
450 LET origin=460: LET choice=
2: GOTO 8340: REM screen dump
460 . . . your program code continues . . .
```

Note that the variable 'choice', indicating the second printer option from the menu given in lines 9921–9929 — that is, the Epson — must be set first and the alternative entry point at line 8340 used to prevent your desired screen being replaced by a menu.

Listing to the printer is also available — see lines 8400–8499 — although I know of only a crude way to stop that before the utilities section is printed — press the SHIFT and BREAK keys. Do not worry about restarting gracefully, because all the routines close the appropriate stream before opening it, thus preventing a "stream already open" error. Note that the routine opens stream 4 to channel "t"; all other printer routines use stream 3 so that LPRINT can be used instead of PRINT #3;.

Finally, a simple but invaluable machine code utility was published in the November 83 issue of *Sinclair User* to block delete Basic program lines. I have modified that slightly (lines 8600–8699) but I acknowledge David Maxwell as original author. The inclusion of that makes up for a glaring omission in the Spectrum interpreter/editor and of course enables you to delete the utilities from around your Basic program if you do not need them. The routine asks you

continued on page 112

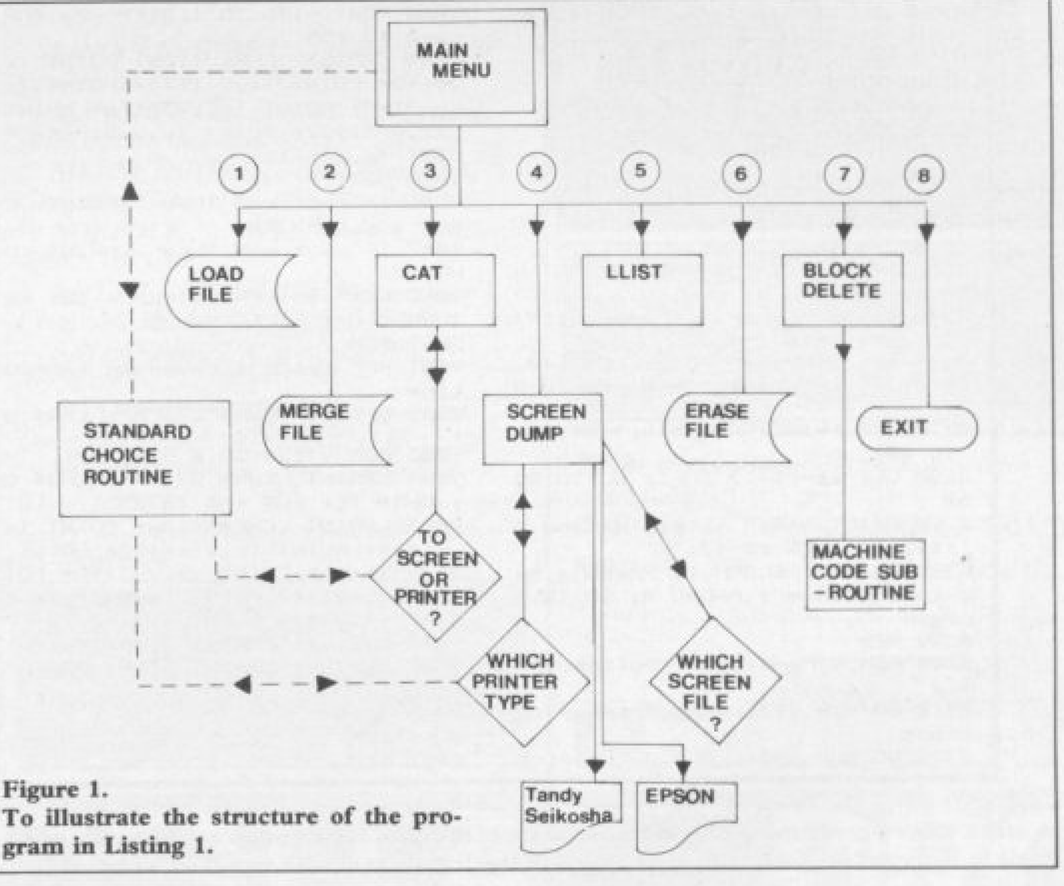


Figure 1.
To illustrate the structure of the program in Listing 1.

continued from page 111

to input the start and end line numbers and then deletes those two lines and all lines between. An error will result if you use the routine to delete itself, but it does not crash the system so other program code is preserved.

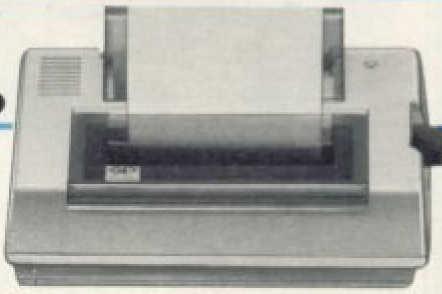
I encourage you to extend the principle to your own individual uses; some possible improvements have already been indicated. Others that I have thought about for the future are: 1 — use LIST to a stream, where the stream has been opened to the microdrive channel; the resulting file is then in data format and can be searched for keywords or variable names — when you are debugging, for example; 2 — set up a screen menu of commonly used programs on the cartridge, so that programs can be run by two key presses, one to auto-load the utilities and one to select the program; 3 — add a line-renumbering facility; and 4 — use MOVE to produce printed listings of any Basic program stored on a microdrive cartridge.

```
7000 REM main menu
7005 CLEAR 65259: REM for m/c
7010 CLS : PRINT  INK 3; AT 0,1;
"MDUS UTILITY SYSTEM @J.B.SOUTER
"
7020 PRINT  AT 2,1;"Key  Option
      [Version 1.7]": PRINT '
7030 PRINT "  1>  load  a progra
m"''
7040 PRINT "  2>  merge a progra
m"''
7050 PRINT "  3>  neat catalogue
"''
7060 PRINT "  4>  screen dump to
 printer"''
7070 PRINT "  5>  list to printe
r"''
7080 PRINT "  6>  erase a file"'
'
7090 PRINT "  7>  block delete l
ines"''
7100 PRINT "  8>  exit to interp
reter"''
7110 PLOT 8,150: DRAW 245,0: DRA
W 0,-137: DRAW -245,0: DRAW 0,13
7
7120 LET baud=600: REM baud rate
 for printer
7130 LET lowest=1: LET highest=8
7140 GO SUB 9941: REM get choice
7150 LET origin=7010: GO TO 7900
+100*choice
7160 REM end of main menu
7170 REM
8000 REM load/merge routines
8010 INPUT "* filename to load:
";f$
8020 IF  LEN f$<1 OR  LEN f$>10
THEN  GO TO 8010
8030 LOAD *"m";1;f$
8040 REM no RETURN needed
8099 REM
8100 REM merge routine
8110 INPUT "* filename to merge:
 ";f$
8120 IF  LEN f$<1 OR  LEN f$>10
THEN  GO TO 8110
8130 MERGE *"m";1;f$
8140 STOP
8199 REM
8200 REM neat catalogue
         version 1.0 31/3/84
8210 LET z$="": GO SUB 9961: IF
choice <> 1 THEN  GO TO origin
8220 LOAD *"m";1;"stream14z$" CO
DE 65260,101: CLOSE # 14
8230 RANDOMIZE  USR 65260: CAT #
14,1: CLS
8240 PRINT "Cartridge name:";z$(
 TO 10): PRINT
8250 LET z$=z$(13 TO ): LET f=0
8260 IF  LEN z$<10 THEN  GO TO 8
290
8270 LET f=f+1: PRINT f;". ";z$(
 TO 10),
8280 LET z$=z$(12 TO ): GO TO 82
60
8290 PRINT ''f;" files leaving "
;z$(2 TO  LEN z$-1);"K"
8295 PRINT ' FLASH 1;"Press a ke
y to continue": PAUSE 0: GO TO o
rigin
8299 REM
8300 REM screen dump routine ver
1.2
8310 GO SUB 9921: REM display op
tions
8320 GO SUB 9901: REM get choice
 of screen file
8330 IF choice=1 THEN  COPY : GO
 TO origin
8340 REM alternative direct entr
y point (from program)
8350 FORMAT "b";baud: CLOSE # 3:
 OPEN # 3;"b"
8360 IF choice=2 THEN  GO SUB 98
81: REM epson
8370 IF choice=3 OR choice=4 THE
N  GO SUB 9861
8380 CLOSE # 3
8390 GO TO origin
8399 REM
8400 REM list to printer ver2
8410 FORMAT "t";baud
8420 CLOSE # 4
8430 OPEN # 4;"t"
8440 LIST #4
8450 CLOSE # 4
8460 GO TO origin
8499 REM
8500 REM erase a file
8510 INPUT "* filename to erase:
 ";f$
8520 IF  LEN f$>10 OR  LEN f$<1
THEN  GO TO 8510
8530 ERASE "m";1;f$
8540 GO TO origin
8599 REM
8600 REM block delete call
8610 GO SUB 9981
8620 PRINT ''; FLASH 1;"done, pr
ess a key to continue": PAUSE 0
8630 GO TO origin
8699 REM
8700 REM exit without erase
8710 CLS : PRINT  AT 10,10; FLAS
H 1;"GOODBYE": STOP
8720 REM end of main menu routin
es
8730 REM
9861 REM Seikosha/Tandy screendu
mp routine
9862 LPRINT  CHR$ 18
9863 FOR y=175 TO 1 STEP -7: FOR
 x=0 TO 255
9864 LPRINT  CHR$ (128+ POINT (x
,y)+2* POINT (x,y-1)+4* POINT (x
,y-2)+8* POINT (x,y-3)+16* POINT
 (x,y-4)+32* POINT (x,y-5)+64* P
OINT (x,y-6));
9865 NEXT x
9866 IF choice=3 THEN  LPRINT  C
HR$ 13; CHR$ 10;
9867 IF choice=4 THEN  LPRINT  C
HR$ 26
9868 NEXT y: LPRINT  CHR$ 30: RE
TURN
9869 REM
9881 REM Epson screendump subrou
tine
9882 LPRINT  CHR$ 27;"A"; CHR$ 8
;
9883 FOR y=175 TO 0 STEP -8
9884 LPRINT  CHR$ 27;"K"; CHR$ 0
; CHR$ 1;: FOR x=0 TO 255
9885 LPRINT  CHR$ (128* POINT (x
,y)+64* POINT (x,y-1)+32* POINT
(x,y-2)+16* POINT (x,y-3)+8* POI
NT (x,y-4)+4* POINT (x,y-5)+2* P
OINT (x,y-6)+ POINT (x,y-7));
9886 NEXT x: LPRINT  CHR$ 13;
9887 NEXT y: LPRINT  CHR$ 27;"A"
; CHR$ 12
9888 RETURN
9889 REM
9901 REM choice of screen files
9902 LET f$="": INPUT "Name of s
creen file:"; LINE f$
9903 IF  LEN f$>7 THEN  GO TO 99
02
9904 IF  LEN f$=0 THEN  RETURN
9905 LET f$=f$+"( SCREEN$ )"
9906 LOAD *"m";1;f$ SCREEN$
9907 RETURN
9908 REM
9921 REM menu of printer choices
9922 CLS : PRINT  AT 8,3;"CHOICE
 OF PRINTER"
9923 PRINT  AT 11,3;"1>  ZX Prin
ter"
9924 PRINT  AT 13,3;"2>  Epson"
9925 PRINT  AT 15,3;"3>  Seikosh
a"
9926 PRINT  AT 17,3;"4>  Tandy L
P VII"
9927 LET lowest=1: LET highest=4
: GO SUB 9941
9928 RETURN
9929 REM
9941 REM standard choice input r
outine
9942 PRINT  INK 0; AT 21,6;"your
 choice:"; FLASH 1;"?";
9943 LET i$= INKEY$
9944 LET choice=( CODE i$)-48
9945 IF choice<lowest OR choice>
highest THEN  GO TO 9943
9946 PRINT  AT 21,18;choice
9947 PAUSE 10
9948 RETURN
9949 REM
9961 REM screen/print choice for
 catalogue
9962 CLS : PRINT  AT 10,3;"CHOIC
E OF CATALOGUE"
9963 PRINT  AT 13,3;"1>  to scre
en"
9964 PRINT  AT 15,3;"2>  to prin
ter"
9965 LET lowest=1: LET highest=2
: GO SUB 9941
9966 IF choice=1 THEN  RETURN
9967 FORMAT "b";600: CLOSE # 3
9968 OPEN # 3;"b": CAT# 3;1: CLO
SE # 3
9969 RETURN
9970 REM
9981 REM block delete routine
         Sinclair User Nov 83
         modified 24-3-84
9982 RESTORE 9986: LET a=65500
9983 READ n: IF n=257 THEN  GO T
O 9988
9984 POKE a,n
9985 LET a=a+1: GO TO 9983
9986 DATA 33,0,0,229,33,0,0,35,2
05,110,25,227,205,110,25
9987 DATA 32,1,235,225,167,237,8
2,216,25,205,229,25,201,257
9988 CLS : PRINT "Block Delete"'
'"Start line: ";: INPUT a: PRINT
 a
9989 PRINT ''"End line:   ";: IN
PUT b: PRINT b
9991 POKE 65501,a-256* INT (a/25
6)
9992 POKE 65502, INT (a/256)
9993 POKE 65505,b-256* INT (b/25
6)
9994 POKE 65506, INT (b/256)
9995 RANDOMIZE  USR 65500
9997 RETURN
9999 REM end block delete
```

Listing 1.
A menu-driven program to provide a useful set of utilities. Each option can be accessed by a single keystroke, thereafter only filenames need to be typed in. Once you have typed in the listing, it should be saved with SAVE *"m";1;"run" LINE 7000

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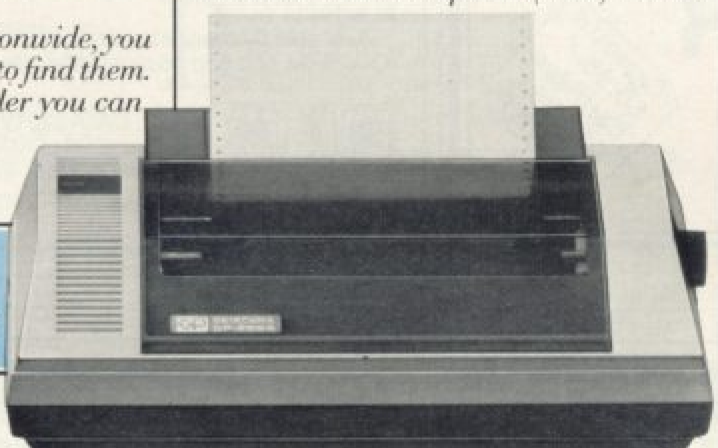
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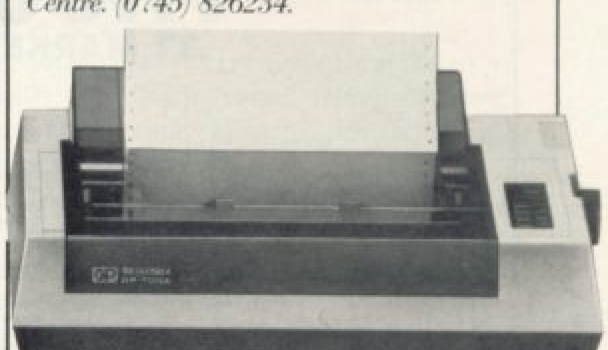
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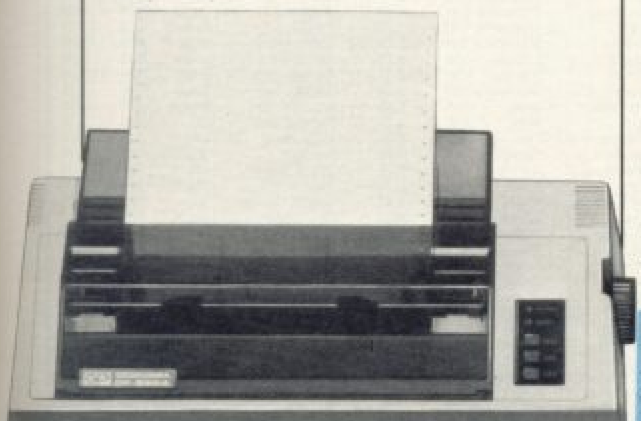
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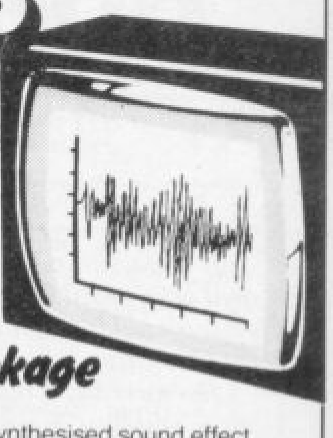
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GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.
Bug — an error in a program.
EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.
Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.
Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.
Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.
Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.
Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.
Port — a link to the outside world which can be used by programs and the computer.
PCB — printed circuit board. A board which has on it the electronic circuits of the computer.
RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.
ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.
Software — programs which control the operation of the computer.
Syntax error — a bug caused by incorrect use of a programming language.



Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the QL computer is big enough for use in small businesses, the Sinclair computers are not really suitable for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson. Recent changes in the ULA should make more sets compatible.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 116

continued from page 115
able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

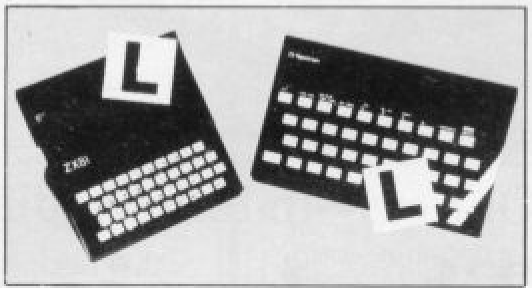
As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD " " followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then rewind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.

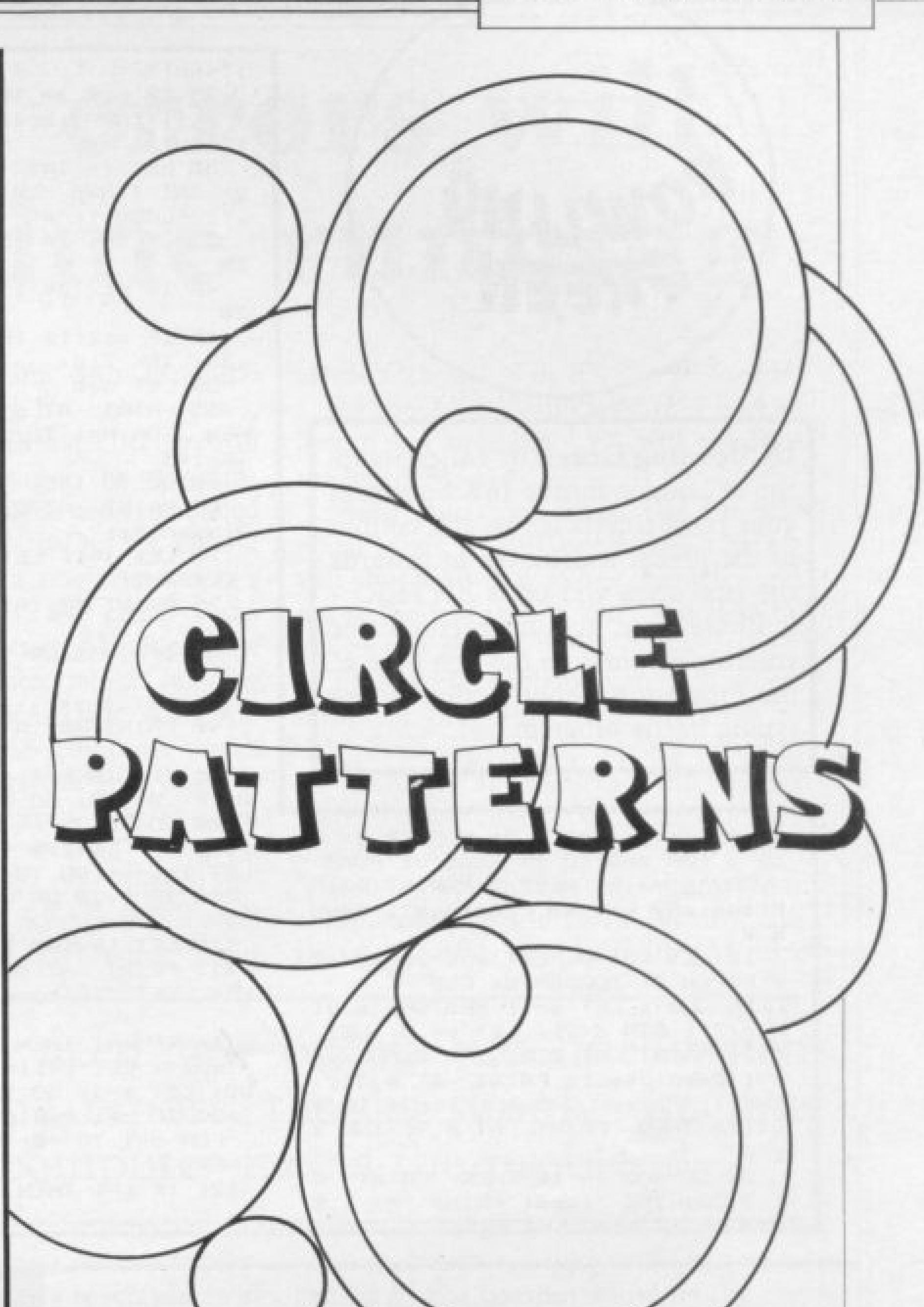
BASKETBALL



```
   3 LET S=PI-PI
   5 FOR V=SGN PI TO CODE "▒"
   6 CLS
   7 LET U=PI-PI
   9 LET Q=INT (RND*CODE "?")+CODE "$"
  10 FOR G=U TO CODE "▐"
  11 PRINT AT CODE "▞",VAL "G*5";"▒▒▒▒▒▒▒▒▒▒";AT G,Q;"█"
  12 NEXT G
  13 PRINT AT U,U;S;AT PI/PI,Q-CODE "▘";"███";TAB Q-CODE "▘";"███"
  20 FOR F=U TO Q-CODE "▘"
  21 PRINT AT CODE "▐",F;"▣"
  23 IF INKEY$<>"" THEN GOTO CODE "M"
  30 NEXT F
  49 GOTO VAL "102"
  55 FOR D=CODE "▖" TO PI-PI STEP -SGN PI
  57 LET F=F+SGN PI
  60 PRINT AT D,F;"O";AT D,F;" "
  63 NEXT D
  80 FOR D=PI-PI TO CODE "▐"
  81 IF U=PI-PI THEN LET F=F+PI/PI
  82 IF D=CODE "▘" AND VAL "F+1"=Q THEN LET U=PI/PI
  83 IF U=PI/PI THEN LET S=S+VAL ".2"
  84 IF F>=CODE "3" THEN GOTO VAL "102"
  85 PRINT AT D,F;"O";AT D,F;" "
  86 NEXT D
 104 NEXT V
 105 PRINT AT PI-PI,PI-PI;S
```

IMPROVE your basketball skills with a program for the 1K ZX-81 by Paul Kecskemety of Cheshunt in Hertfordshire. The screen displays a basketball net and you are represented by an inverse 'A' which moves from left to right. Press any key to throw the ball at the net, and see how many you can score.

To save space, Paul has used character codes instead of ordinary numbers. To find out what the codes represent, look at appendix A in the ZX-81 manual.



CIRCLE PATTERNS draws up to sixty different patterns based on the CIRCLE command, which is used here in an unusual way. The patterns generated look very like tesselating floor tiles and could be used to good effect in title screens.

The program was written for the 16K Spectrum by D Trebilcock of Sale in Cheshire.

Program Explanation

Variables:

col	the number of the colour used
rad1	the radius of the inner circle
rad2	the radius of the outer circle
amend1	adjustment to the horizontal print position
amend2	adjustment to the vertical print position
dec	size factor for the pattern
c	control for FOR/NEXT loop
a,b	hold data for print positions

Line 20	Sets ink to black and the rest of the screen to white.
Line 30	Sets the colour for the pattern at random.
Line 40	RESTORE tells the computer to start READing data from a particular DATA statement — in this case at line 250. Without the RESTORE command, when the program was executed for a second time the computer would be unable to find any more data to load.
Line 60-70	Set two different figures for a radius of the circle. Depending on the size of each unit in the pattern, there may be more than one circle in each unit.
Line 80-90	Set two separate figures for adjusting where each part of the pattern is to be printed.
Line 100	Sets a factor for the size of the pattern units; 0, 1 or 2.
Line 110	The main loop of the program starts here. There are 23 units to be drawn.
Line 120	READs the print positions from DATA statements starting at 250. When the first statement is used up the computer moves automatically to the next.
Line 130	If the unit size is 1 or 2 the computer draws a small circle. Normally with CIRCLE the circle is a curved line. Here, because INK and PAPER colours are set the same, the whole character square through which the circle passes is set to one colour. This is a peculiarity of the Spectrum use of colour which for once has been turned to good advantage. Try changing either the INK or PAPER colours and see what happens.
Line 140	If the unit size is 0 or 1 the computer draws a larger circle, some of which may obliterate parts of the earlier circle.
Line 150	INKEY$ checks to see if you are pressing the keyboard. In this case, if you press "S" the program will STOP.
Line 160	The loop returns to line 110 to draw another unit.
Line 170-180	The computer pauses to display the finished pattern and then goes back to line 30 to set a new colour and draw a new pattern.
Line 250-260	DATA statements which contain the co-ordinates for printing the pattern. The program will READ them two at a time and then adjust them slightly for more variety. See what happens if you alter a few of them.

```
  20 BORDER 7: PAPER 7: INK 0
  30 LET col= INT ( RND *7)
  40 RESTORE 250
  50 CLS
  60 LET rad1= INT ( RND *10+4)

  70 LET rad2= INT ( RND *7+16)

  80 LET amend1= INT ( RND *9-4)

  90 LET amend2= INT ( RND *4)
```

```
 100 LET dec= INT ( RND *3)
 110 FOR c=1 TO 23
 120 READ a,b
 130 IF dec>0 THEN  CIRCLE  PAPE
R col; INK col;a+amend1,b+amend2
,rad1
 140 IF dec<2 THEN  CIRCLE  PAPE
R col; INK col;a+amend1,b+amend2
,rad2
 150 IF  INKEY$ ="q" OR  INKEY$
="Q" THEN  STOP
 160 NEXT c
 170 PAUSE 90
 180 GO TO 30
 250 DATA 83,150,131,86,131,22,2
03,118,107,54,59,118,179,86,83,2
2
 260 DATA 107,118,35,86,59,54,22
7,22,35,150,179,150,155,54,35,22
,179,22,131,150,83,86,155,118,22
7,86,203,54,227,150
```



IN **Bowling Green** by Miles Sampson of London for the 16K Spectrum your bowl travels across the bottom of the green, and moves in towards the jack when you press ENTER.

Please read the instructions for entering graphics on the first page of the Program Printout section before typing in the program.

```
  5 INK 5: PAPER 0: BORDER 0: C
LS : FOR a=0 TO 7: READ b: POKE
 USR "A"+a,b: NEXT a: PRINT #0;"
Press any key to continue": PAUS
E 0
  10 LET sc1=0: LET sc2=0: INK 7
: PAPER 0: BORDER 0: CLS
  15 CLS : LET z=1: RESTORE : DI
M c(2): DIM d(2): LET v=.5: LET
i=2: PRINT  AT 0,0; INK 7;"Playe
r 1(2*sp)";sc1: PRINT  AT 0,21;
INK 7;"Player 2(2*sp)";sc2: IF s
c1<10 THEN  PRINT  AT 0,9; INK 7
;"0"
  20 IF sc2 >= 10 THEN  PRINT  A
T 0,30; INK 7;sc2: PRINT  AT 1,0
;"(sp)"
  25 IF sc1 >= 10 THEN  PRINT  A
T 0,9; INK 7;sc1: PRINT  AT 0,11
;"(sp)"
  30 LET f= INT ( RND *31): LET
g= INT ( RND *20)+1: PRINT  AT g
,f; FLASH 1;"*"
  35 IF sc1 >= 15 THEN  GO SUB 2
20
  40 IF sc2 >= 15 THEN  GO SUB 2
20
  45 IF sc2<10 THEN  PRINT  AT 0
,30; INK 7;0
  50 LET b=0
  55 PRINT  AT g,f;"*": IF b=1 T
HEN  FOR h=1 TO 100: NEXT h: GO
TO 145
  60 GO TO 135
  65 PRINT  AT 0,12; INVERSE 1;"
Player ";i
  70 LET j=1: LET k=1: LET l=21:
 LET m=21
  75 PRINT #0; AT 0,j; INK n;"A"

  80 IF j=31 OR j=0 THEN  LET k=
-k
  85 LET j=j+k
  90 PRINT #0; AT 0,j-k;"(sp)"

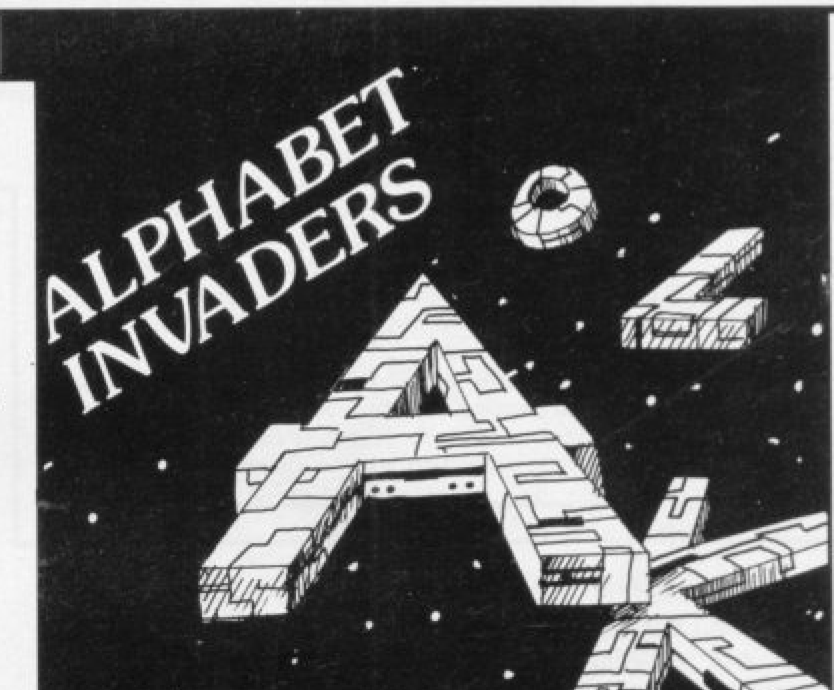
  95 IF  INKEY$ = CHR$ 13 THEN
BEEP .01,20: GO TO 105
 100 GO TO 75
 105 IF  INKEY$ = CHR$ 13 THEN
LET l=l-v: GO TO 105
 106 IF v=20 OR v=1 THEN  LET v=
-v
 110 LET l= INT l
 115 PRINT  AT m,j;"A": IF m=1 T
HEN  LET c(i)=g-m: LET d(i)=f-j

 116 IF m=1 THEN  PRINT  AT 1,j;
"(sp)": LET c(i)=100: LET d(i)=1
00: LET z=1: GO TO 55
 120 IF m=1 AND g=m AND f=j THEN
  FOR o=1 TO 40: BEEP .002,o+25:
 NEXT o
 121 IF i=1 THEN  LET t=m: LET u
=j
 122 IF i=2 AND z <> 1 THEN  PRI
NT  AT t,u; INK 4;"A"
 125 IF m=1 THEN  GO TO 55
 130 PRINT  AT m,j;"(sp)": LET m
=m-1: GO TO 115
 135 IF i=1 THEN  LET i=2: LET n
=6: INK 6: LET b=1: GO TO 65
 140 LET i=1: LET n=4: INK 4: LE
T b=0: GO TO 65
 145 LET p= ABS c(1)+ ABS d(1):
LET a= ABS c(2)+ ABS d(2)
 150 IF p=0 AND a <> 0 THEN  LET
 sc1=sc1+2
 155 IF a=0 AND p <> 0 THEN  LET
 sc2=sc2+2
 160 IF p<a THEN  LET sc1=sc1+1

 165 IF a<p THEN  LET sc2=sc2+1

 170  IF sc2 >= 10 THEN  PRINT
AT 0,30;sc2: GO TO 15
 175  IF sc1 >= 10 THEN  PRINT
AT 0,9;sc2
 180 PRINT  AT 0,10;sc1; AT 0,31
;sc2
 185 IF sc2<10 THEN  PRINT  AT 0
,30;0
 190 IF sc1<10 THEN  PRINT  AT 0
,10;0
 195 GO TO 15
 220 CLS : FOR r=1 TO 30: BEEP .
05,r: NEXT r
 225 IF sc1 >= 15 THEN  CLS : PR
INT  AT 9,8; INK 4; INVERSE 1;"P
layer 1 wins"
 230 IF sc2 >= 15 THEN  CLS : PR
INT  AT 9,8; INK 6; INVERSE 1;"P
layer 2 wins"
 235  FOR s=1 TO 250: NEXT s
 240  CLS : PRINT  AT 9,10;"Agai
n y/n ?"
 245 IF  INKEY$ ="" THEN  GO TO
245
 250 IF  INKEY$ ="y" THEN  CLEAR
 : GO TO 10
 255 STOP
 260 DATA 126,255,255,255,255,25
5,255,126
```

```
  5 LET H=.
 10 CLS
 15 LET Z=-1
 20 LET K=9
 25 PRINT AT 10,K;" ▄ "
 30 LET L=INT (RND*26)+38
 35 FOR F=. TO 18
 40 PRINT AT 3,F;" ";CHR$ L
 45 IF INKEY$=CHR$ L THEN GOTO
65
 50 IF INKEY$="1" THEN GOTO 145
 55 NEXT F
 60 GOTO 10
 65 IF F>K THEN GOTO 90
 70 FOR N=K TO F-1 STEP -1
 75 PRINT AT 10,N;" ▄ "
 80 NEXT N
 85 GOTO 105
 90 FOR N=K TO F-1
 95 PRINT AT 10,N;" ▄ "
100 NEXT N
105 IF F<=K THEN LET Z=-3
110 FOR F=8 TO 3 STEP -1
115 PRINT AT F+1,N-Z;" ";AT F,N
-Z;"."
120 NEXT F
125 PRINT AT 3,N-Z;CHR$ (L+128)
130 PAUSE 25
135 LET H=H+1
140 GOTO 10
145 CLS
150 PRINT "HITS=";H
```



THE ALIENS are sending us letters, which makes a change from guided missiles. Earth's reactions have not changed, however — you still have to shoot them down. Instead of using one key to fire, in **Alphabet Invaders** you must press the key corresponding to the letter you see on the screen.

Alphabet Invaders was written by Adam Leonard of Mossley in Lancashire, and runs on the ZX-81 in 1K.

Trapping the errors will ensure first-time running

THE FIRST error code encountered by most Sinclair users is the flashing "S" on the ZX-81 or "?" on the Spectrum, which indicates a syntax error in a sentence. Experience and the manual soon show that it is caused usually by typing-in a keyword letter by letter, or by bad punctuation, for example omitting a semi-colon or an inverted comma.

The most frequently-occurring error code is "2" — variable not found. A variable is a letter which has been given a numeric value. When you enter "LET a=2" you are defining a variable. Error code 2 results when the computer reaches a variable in the program to which you have so far given no value.

Check the line which the computer specifies. If it is your program, give a value to the variable or remove it. If you are copying the program, look back in the listing to see which line you have missed.

Although the majority of error codes are explained adequately in the manuals, the report "B-Integer out of range" can be confusing. An integer is a whole number — 1 is an integer, 1.5 and 1½ are not. That code occurs most frequently when you try to print something beyond the limits of the screen.

PRINT AT 0,31; "a" is acceptable and will print a letter "a" at the top right of the screen. PRINT AT 0,32; "a" would not be possible. The integer 32 would be out of range, resulting in error code "B". That would also happen if the computer were instructed to PRINT AT 0,31;"ab". It would still be trying to print a character beyond the limits of the screen.

That error is more difficult to detect if variables have been used as co-ordinates and your character, or series of characters, is being printed in varying positions. If the instruction PRINT AT 0,x;"a" produces report code B, make sure that the value of x never increases beyond 31.

On the Spectrum "B-integer out of range" is also often found when you are POKEing-in user defined graphics. The biggest number which can be POKEd-in this case is 255 or BIN 11111111. In that case the error code will occur in the line containing the POKE statement. In most cases, though, the error will have occurred in one of the DATA lines in the program.

A very frequent error code produced on the Spectrum is "E-Out Of Data". That will occur in a line containing a READ statement. The error code, though, will have occurred in one of the program DATA lines, which may be nowhere near the READ line. A READ command sends the computer to a DATA line to collect the next piece of DATA contained there. That is often done using a FOR, NEXT loop, especially when graphics are being set up.

FOR n=1 TO 8: READ n will send the computer to the DATA lines eight times, for eight separate pieces of information. If there are only seven pieces of DATA there it will return to the READ line and produce the code OUT OF DATA. When there are several DATA lines they will all have to be checked, because the piece of DATA you have omitted was not necessarily the last.

In some cases the computer will follow the program correctly, without producing an error code, but from the programmer's point of view the program contains an error. In that case BREAK into the program at the moment it goes wrong. That will produce report code 9 and the line on which you have STOPped the program. That method makes it easy to locate the area of the program which contains the error.

Programs which you copy from magazines, books or from friends can be difficult to error-trap because they contain programming techniques which you have not yet learned, or simply because it is often difficult to follow another programmer's logic.

The flashing "S" or "?" indicating a syntax error may appear frequently. In that case check carefully what you have copied. You may not have recognised words such as LN or EXP as keywords.

On the ZX-81 especially it is easy to forget that pressing "π" will produce the word PI.

Make sure that when the "is not equal" sign, "< >" appears in a listing you always enter it as one character and not as "is less than", "<" followed by "is greater than", ">".

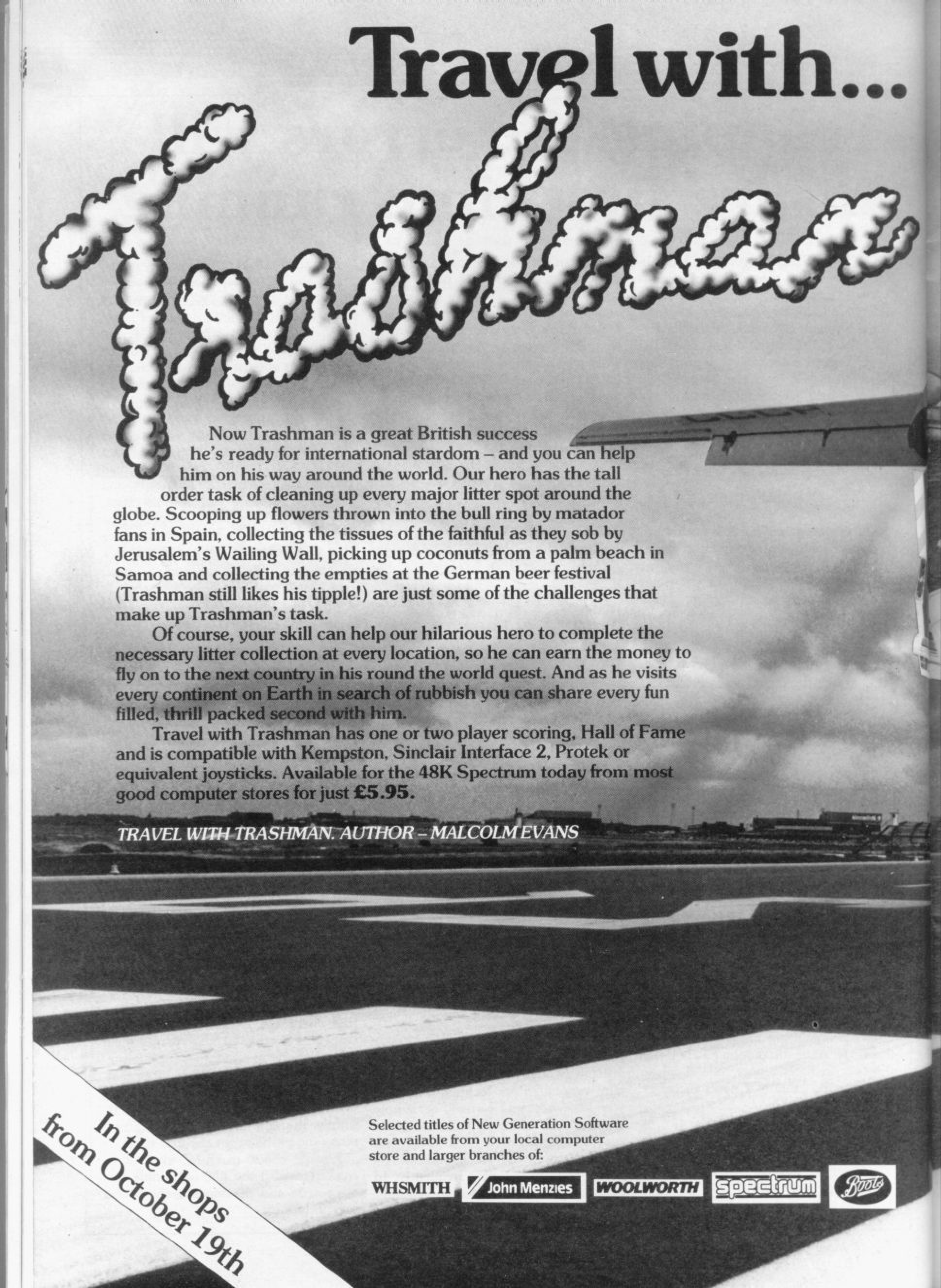
Technical problems can also cause errors in programs. Any alteration to the power supply can cause a program to CRASH. In that case the screen display may change dramatically and using the keyboard will have no effect. The only solution is to unplug your computer and begin again, making sure that your power supply and RAM pack are both connected firmly. That error is caused by the computer and not by the program.

> 'The error need not be on the line which produces the report; that is simply the line where the computer meets the problem'

Sometimes a program listing in a book or magazine will contain what seems to be a very obvious error. If it contains key words or symbols which are not on your computer, check that it is intended for your machine. Programs for the Spectrum, the ZX-81 and the ZX-80 are not usually directly interchangeable. If a program contains the command GOTO or GOSUB — a non-existent line number — the computer will simply go to the next numbered line after that one. That is a sign that a program has been developed and improved and is rarely an error.

When you have errors in a program, first check the report codes listed in Appendix B of the manual. It may then be necessary to read the appropriate section of the manual. Remember that the error is not necessarily on the line which produces the report code; that is simply the line where the computer meets the problem for the first time.

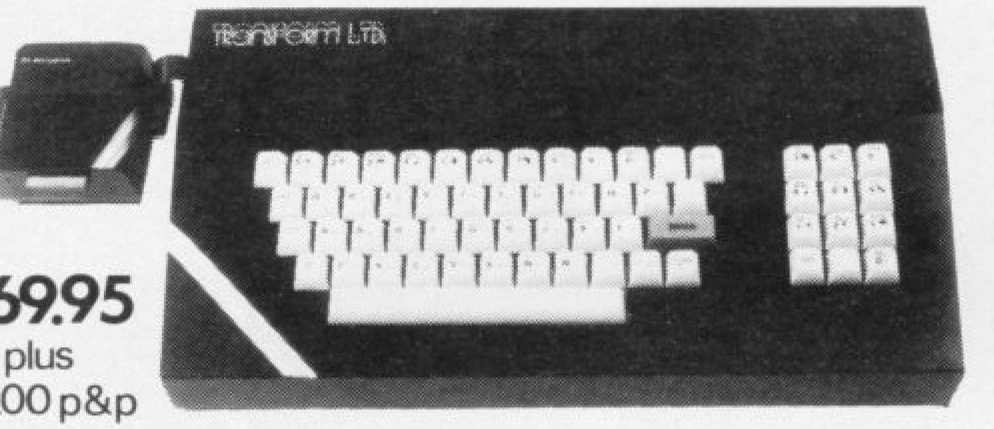
Always check carefully every line connected with the line containing the error code and the mistake should be easy to locate.


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Now Trashman is a great British success he's ready for international stardom – and you can help him on his way around the world. Our hero has the tall order task of cleaning up every major litter spot around the globe. Scooping up flowers thrown into the bull ring by matador fans in Spain, collecting the tissues of the faithful as they sob by Jerusalem's Wailing Wall, picking up coconuts from a palm beach in Samoa and collecting the empties at the German beer festival (Trashman still likes his tipple!) are just some of the challenges that make up Trashman's task.
Of course, your skill can help our hilarious hero to complete the necessary litter collection at every location, so he can earn the money to fly on to the next country in his round the world quest. And as he visits every continent on Earth in search of rubbish you can share every fun filled, thrill packed second with him.
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SINCLAIR USER JUNE 1984

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Word Processing by Tasman **£13.90**
Tasword Two is a powerful word processing program that will perform all the functions available on large processors. The program will give you 64 characters per line on screen.

Masterfile by Campbell Systems **£15.00**
This is one of the best database programs available for the ZX Spectrum. This program has many uses in a small business.

Dlan by Campbell Systems **£7.95**
Use your Spectrum to sell your products. Dlan will display messages in up to 11 different typefaces. Will scroll text in any direction.

64 Column Generator by Tasman **£5.50**
You can use this program within your other programs to display 64 columns on screen.

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Sales/Purchase Ledger Invoicing £25.00
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Allows you to transfer data from Masterfile into Tasword enabling you to use Tasword for mail merge. The program allows you to specify line and column of each field. For use on micro-drive only.

Superfile £14.95
This is a new database program that stores pages of text 64 columns x 22 rows. The program includes word processing and full search facilities.

Omnicalc 2 £14.95
This is the long-awaited micro-drive version of omnicalc complete with histograms and many other features.

Projector 1 £13.90
Business graphics program that will help you present your cashflow, sales expenditure in many different ways including pie line, and histogram charts.

Tasprint £9.90
Use this program with Tasword Two to produce 5 different fonts on a dot matrix printer.

MF-Print £6.95
Enables you to set a print format for your full-size printer within masterfile. Supplied complete with masterfile for **£19.95.**

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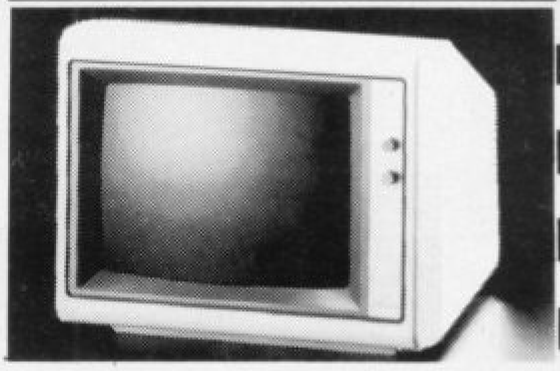
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QL

Transform can supply a wide range of printers monitors, and leads for the QL. For further details send S.A.E.

Monitors



It is possible to connect your Spectrum to both Black/Green and composite Video monitors using high resolution monitors are particularly useful with programs like Tasword that use 64 columns. We supply complete instructions on how to connect monitors to both Issue Two and Issue Three Spectrums. These monitors can also be connected to your QL.

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All the software we supply runs on full-size printers (unless you are using interface 1) you will require an interface to connect your Spectrum to a printer, the interface we supply uses the graphics characters to set printer codes as in Tasword and prints a double size screen dump.

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BARCLAYCARD VISA

Contents

On this page readers express their dissatisfaction with business software.

Overleaf Mike Wright compares word processing packages for the Spectrum.

SINCLAIR BUSINESS USER

October 1984

Quick response from Psion

AFTER READING the letter from Peter Norman of Psion in your August issue I took him up on his offer and phoned him. I received the instructions by return of post.

That quick reaction somewhat surprised me after my previous experiences with software houses, because I tend to believe nothing they say or promise.

In February, after receiving my microdrive I wrote to Psion, Print'n'Plotter, Melbourne House, Dream, Tasman and dK'tronics for information about transferring software to Microdrives.

The results were Psion — no response at all; Print'n-'Plotter — no response at all, though they produced a leaflet on demand at a recent ZX Fair; Melbourne House — their response was 'too difficult'; Dream — no response; dK'tronics — in spite of my request for Light Pen information I was sent a leaflet about keyboards; Tasman — as ever replied promptly with all information.

The above experience led me and my wife to spend many interesting hours investigating the various methods of protecting software and in the process, with the aid of the Crystal Computing **Monitor and Disassembler,** we learnt a lot about the Spectrum architecture. A printer also helps reveal the hidden lines some people use.

Following on from the above I would like to suggest that my experience has been good training if I want to pirate anything and, of course, in the process of the investigation I was not buying any other software. So the software houses have only themselves to blame for the fall in sales this year as I have no doubt many people were doing the same.

In my job I have to deal with the big boys in the computer world, including the biggest, and, quite frankly, except for notable exceptions — which would not include IBM — they are not a lot better than Sinclair and associated manufacturers. At least with Sinclair you get your money's worth.

David Price,
Hatfield,
Hertfordshire.

Problems with cash control

FOLLOWING the letter in *Sinclair Business User,* July, by M J Grocott, I too have experienced problems with **Cash Controller.**

I raised those points with Richard Shepherd Software but was unable to receive a satisfactory solution to the problem that would allow the 400 transactions claimed.

Despite personal letters to Richard Shepherd the only offer forthcoming was from the technical assistant to refund the price. I accepted that and have since purchased alternative software that lives up to its superior specifications and performs at a higher speed.

M A Larcombe,
Burgess Hill, W Sussex.

Piracy made easy

I READ the letter — *Sinclair Business User,* August — from Peter Norman, of Psion Ltd, with amazement and disbelief.

Did he expect to be taken seriously, or was it a clever attempt to introduce a touch of subtle humour into your business section? What is to stop your average software pirate from writing to Mr Norman and requesting "two pages of detailed instructions on how to transfer **Vu-File** and **Vu-Calc**"? I can only presume that the typical software pirate is either unable to read or write or leaves telltale signs on all correspondence, that Mr Norman can identify on sight — skull and crossbones postmarks, parrot dropping. I'm sorry, Mr Norman, but you'll have to do better than that.

Thank you for introducing a business section — it's nice to know that there are at least some people out there who don't regard the Spectrum as a toy.

W H Roberts
Pencoed,
Mid Glamorgan.

Useless Vu-Calc

I SHOULD like to echo M Dagnall's dissatisfaction with **Vu-Calc** — *Sinclair Business user,* July. This software is so limited as to be useless, even as an educational toy. I suppose it is too much to expect serious software for under £10, or is it?

With volume sales and profits from games Psion should be able to produce an efficient spreadsheet program at that price. If it cannot it should at least be honest and say so. For it to claim that Vu-Calc "turns the Spectrum into an immensely powerful analysis chart" is misinformation at its least sublime.

Psion is not the only software company guilty of gross exaggeration, but it should know better. As indeed, should Sinclair Research, but that's another story. I for one refuse to throw good money after bad and am now busy saving my hard-earned cash to upgrade my micro. I do not think it necessary to spell out which machine I will not be purchasing.

Byron Simmonds,
Surlingham,
Norwich.

Which word processor? Mike Wright finds some programs too unprofessional for words

Searching for the write stuff

WORD PROCESSOR programs are the most common of the 'business' programs and their use extends beyond the workplace to the home and school. This month four word processing packages are reviewed: **Word Processor** from Quicksilva; **Tasword Two** from Tasman Software; **Micropen** from Contrast Software; and **Spectext** from McGraw-Hill. The prices vary considerably and, as you might expect, so too does the quality and features of the programs.

Word Processor is the first venture by Quicksilva outside the games market. The program takes about a minute to load and is written completely in Basic. The inlay provides one side of loading instructions and two sides of adverts for other Quicksilva products. The instructions, such as they are, for using the program are included as a help option in the program.

Once Word Processor has loaded it displays a menu of seven options. Those are: 0 — Exit; 1 — Help; 2 — Clear machine for new text: 3 — Edit text; 4 — Print text; 5 — Load text; 6 — Save text. On first loading option 1 must be chosen to discover what features and commands are available. There are three screens of Help information altogether but it is not until the second screen that you find out that a copy of the screens can be produced by pressing CAPS SHIFT and 4. Of course, if you now want a copy of page 1 you must return to the main menu.

There are two types of commands. The first set is for editing from the keyboard. The commands are formed by a combination of CAPS SHIFT and a numeric key. Most of them follow the Spectrum commands, so that 5, 6, 7 and 8 are used to move around the text, 2 and 3 control the CAPS LOCK and 0 deletes the character to the left of the cursor, 1 is used to clear a line of text, marked by the cursor, and 9 is used to create a blank space for inserting a character. CAPS SHIFT 4 is the print command but it will only copy the screen. If you have only two or three lines of text that wastes a lot of paper.

The other commands are used by first going into Extended mode — i.e. by pressing both shift keys together — before selecting the command. The commands allow the user to move the position of the cursor to the top, the bottom or any line of text; to mark and delete a block of text; to open up the text to allow extra text to be inserted and then to close it up again. However, all commands must be given at the start of a line or they are overwritten on the text and are ignored. When characters are deleted they are replaced by spaces.

The usual facilities of a word processor such as a choice of margin settings, type of justification and a search and replace feature are all missing. Although a wordwrap feature is included, so that if a word straddles the end of a line it is automatically transferred to the start of the next line, it is so slow as to be almost pointless.

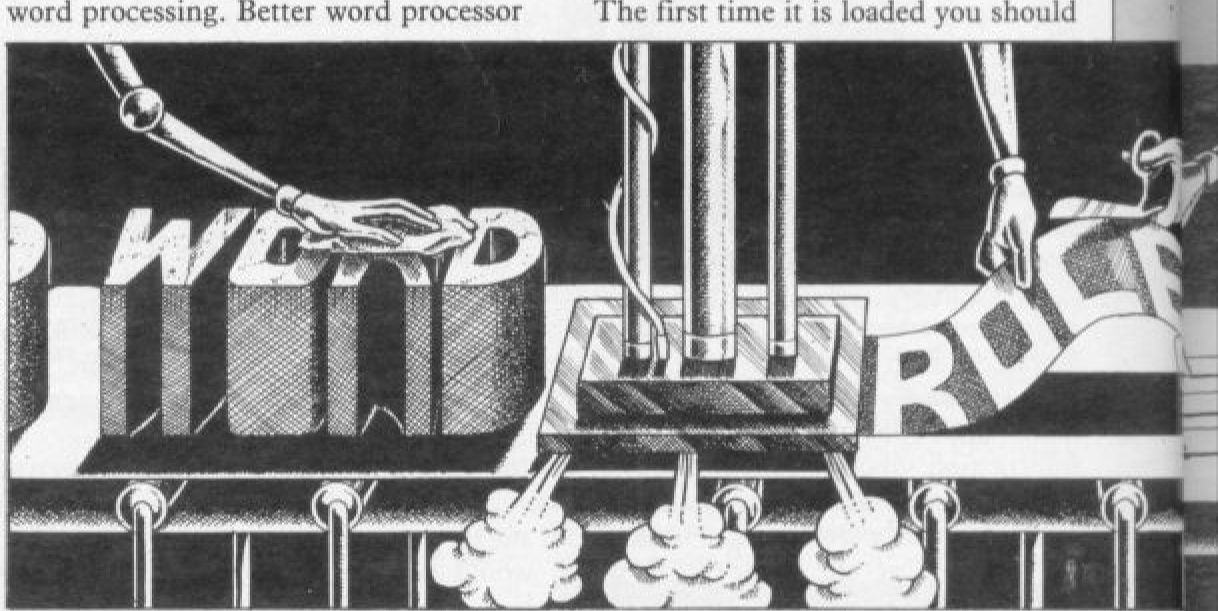
This is not a program to be recommended even as an introduction to word processing. Better word processor programs have been printed in the listings section of some magazines.

By comparison **Tasword Two** is probably the most commonly used business program for the Spectrum. It is produced by Tasman Software and is accompanied by a manual. It is, surprisingly, the only package of the four that has such a manual and included in it are two very useful sections, one on adapting Tasword Two to drive almost any printer interface currently on the market, and one on converting it to run from microdrive. Tasword Tutor, an instructional text file designed to help the user learn the commands, is also provided on the cassette.

One of the great drawbacks of word processors for the Spectrum has always been the 32-column screen width. Tasword uses a redefined character set which gives 64 characters per line. An option to display a 32-column window in normal size is available if the characters are too difficult to read on your television.

The program boasts an impressive list of features that are found usually only on much more expensive programs. Those include wordwrap, setting of margins, rejustification of text, block copy and move, replacement of any word by another word, and control of the print type for printers other than daisy wheels.

The first time it is loaded you should establish the control codes for your printer. That is done by pressing SYMBOL SHIFT A to stop the program and display a menu of loading, saving and printing options. Option g is used to redefine the graphics on keys 1-8 as printer control codes. On first loading they are set with codes for the Epson FX-80 typefaces.



That menu is also used to enter Basic while retaining Tasword Two in memory so that it can be modified to run from a microdrive. Full instructions on the necessary changes are given in the manual. Once the changes are made and the program run the same menu is used to save the customised version.

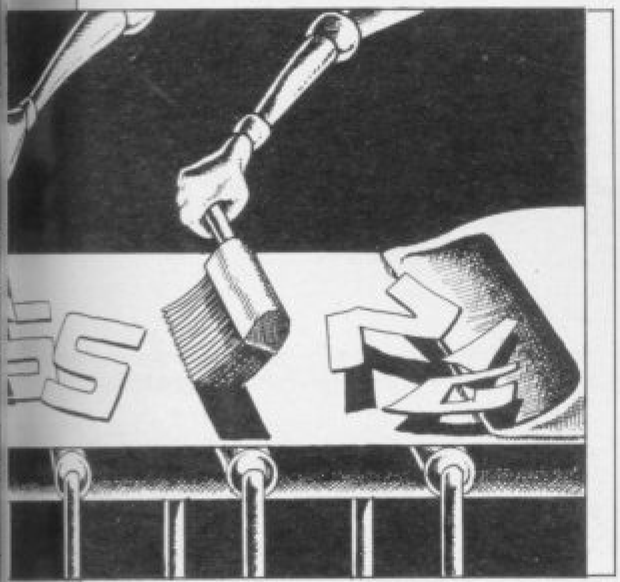
The last two lines on the screen are used to display a status report on the text, including the position of the cur-

sor by line and column, and whether the right justification, insert mode and wordwrap are on and off, as well as a pointer to select EDIT for help. Selecting EDIT produces a list of commands and their functions together with an option for a further list. Those are taken directly from the manual.

At the start the wordwrap is on, the text is justified — in other words it appears as the text does on this page — and is overwritten at the cursor's position. The wordwrap is fast enough for letters not to be lost while it is functioning. Wordwrap can be switched off. The justification can also be turned off allowing text to be justified on the left but ragged on the right. A third option allows lines of text to be centred. Individual lines can also be justified or unjustified. The only automatic justification, however, is on new text. If text is deleted then the spaces remain until the paragraph is reformed.

One very useful feature enables you to mark blocks of text and then to move or copy them to other points in the text.

Another powerful feature is the Re-



place, or find, command.

At its price Tasword Two is an outstanding program. It has managed to overcome many of the inherent disadvantages of the Spectrum in providing features which one would normally expect on much more expensive programs. One notable feature for commercial use not included is a mailmerge facility. That has now been corrected and a Tasmerge program that will allow data to be taken from a Masterfile file should be available soon.

The third offering is **Micropen** from Contrast Software. The program is remarkably easy to use. All the text editing commands require only the CAPS SHIFT and a numeric key. The features offered include justification, reformatting of paragraphs after deletions, user-defined graphics and a search facility.

Unlike the other programs there is not even the most basic of status reports. You are left to remember your position within the text. That makes using the option to move to any particular line difficult. Otherwise movement through the text is achieved using the cursor keys.

When new text is added the existing text is automatically reformatted. However, when text is deleted the paragraph needs to be reformatted manually. The justification can be turned on and off. The search option can be used to search for any string in the text. If you search for a non-existent string the program will continue looking forever and to escape you must break into the program. Numerical key 9 asks for the text to be entered and permits the entry of graphics characters — including user-defined.

The options to load, save, create, edit and print a file form a separate menu.

Once again the manual is supplied as a text file already held in memory and to use Micropen the manual has to be cleared from memory and a new file created. Another, more important, drawback is the program speed. The wordwrap is only slightly faster than that of Word Processor and even a two-fingered typist will soon overtake the program. Against that must be balanced its ease of use. It would, possibly, make a good introductory program to demonstrate some of the facilities available on 'grown up' word processors. As a business program it compares favourably with the Quicksilva Word Processor.

Spectext from McGraw-Hill promises a great deal including all the features of a full word processor, a filing system and a Mailmerge facility as well as being microdrive compatible. In fact Spectext consists of four programs — Spectext, Specfile, Specmerge and printmod on one side of the cassette.

On opening the case, however, you are likely to be disappointed. There is no printed manual. Instead a leaflet is provided explaining how to load the program followed by the first of two text files that comprise the manual. That can be printed on a full-size printer, although it seems that only the Kempston, Hilderbay and Interface 1 interfaces are supported by the software. I was unable to get it to work with my Tasman interface and had to resort to the ZX printer. That resulted in a manual eight feet long.

On loading the program displays a menu which offers eight options: 1 — Enter text; 2 — Load text; 3 — Print text; 4 — Read/Edit text; 5 — Save text; 6 — Reorganize; 7 — Switch printers; 8 — Catalogue. You select the first option to start typing in text.

A special keyboard-scanning routine is used to speed the Spectrum response. It works so well that even the fastest typist is unlikely to outstrip it. New lines, paragraphs and pages are inserted by pressing ENTER and 1, 2 or 3 respectively or z — to return to the main menu — followed by ENTER again. That slows down the input and somewhat defeats the purpose of the keyboard-scanning routine.

The biggest disadvantage lies in the way it displays text on the screen. It is unformatted and is effectively treated as one continuous line of characters interspersed with graphics characters to show where paragraphs and pages start. The text is formatted as it is printed but cannot be justified.

To edit text option 4 is used. That allows commands to be used at two levels. At the first level text can be added, deleted or printed from the cursor position to the end. Those functions are accessed by a, d or c respectively. Pressing z leads to the next level. An indicator is used to show the current option, ENTER is used to toggle between the search and replace options and a block move facility. Before text can be moved it must be deleted. For some reason the move option moves the last piece of deleted text.

Options 2 and 5 are used to load and save text. Both microdrive and cassette can be used. Using the microdrive facility to store text still leaves the program to be loaded from tape.

The text is printed using option 3 and option 6 allows the user to change some of the parameters such as the number of characters per line, the left margin and number of lines per page as well as offering automatic page numbering and double spacing.

Specifile is used to set up a simple database for subsequent use with Specmerge. Like Spectext it is run from a main menu which allows the database to be designed, to add, sort or search and edit the file, as well as the usual save and load facilities. The design option is used to establish the number of fields in the database and their names. Once designed the data is entered via the add option. That prompts for the fields one at a time and also shows the available space; to finish adding data the STOP

continued on page 128

continued from page 127

Function key is used. The records can be searched for any string or any field edited using the search/edit option. That permits unwanted records to be deleted. Sort allows the database to be sorted into alphanumeric order on any one field.

Specmerge allows a specially prepared text file to be merged with fields from Specfile. An up arrow followed by a series of numbers, corresponding to the fields in Specfile, and a second up arrow marks the places in the text where the contents of those fields will be inserted. The feature makes the reproduction of personalised letters very easy.

Of the four programs only Tasword and Spectext can be said to approach the standard necessary for business use. Spectext itself is a useful but limited word processor but the addition of Specmerge improves it. Unfortunately it is not improved sufficiently to challenge Tasword, unless mailing-list facilities are the main requirement.

Quicksilva Ltd, 13 Palmerston Road, Southampton, SO1 1LL.

Tasman Software, 17 Hartley Crescent, Leeds, LS6 2LL.

Contrast Software, Farnham Road, West Liss, Hampshire GU33 6JU.

McGraw-Hill Book Co Ltd, Maidenhead, Berks SL6 2QL.

	Word Processor	Tasword Two	Micropen	Spectext
On screen formatting	✓	✓	✓	
Supports full-size printer		✓		✓
Control typefaces	n.a.	✓	n.a.	
Wordwrap	✓	✓	✓	
Set margins		✓		left only
Justification/centre		✓	left and right	
Block: Copy		✓		✓
Block: Delete	✓	✓		✓
Search/Replace	✓	✓		✓
Mailmerge				✓
Microdrive		✓		text only
Printed manual		✓		

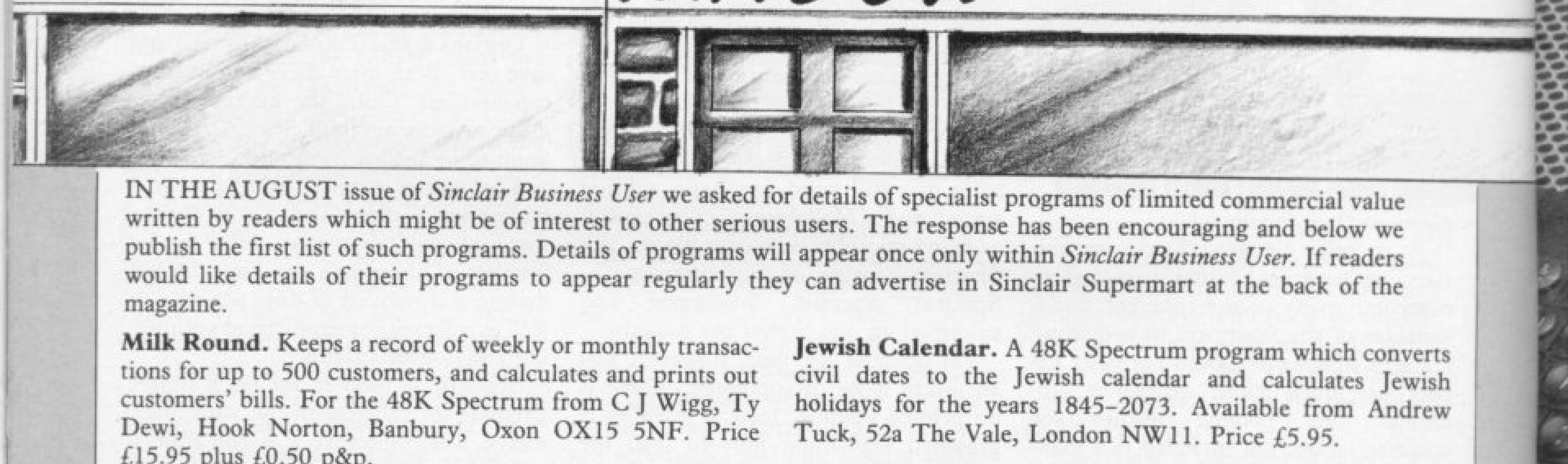
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SHOP WINDOW



IN THE AUGUST issue of *Sinclair Business User* we asked for details of specialist programs of limited commercial value written by readers which might be of interest to other serious users. The response has been encouraging and below we publish the first list of such programs. Details of programs will appear once only within *Sinclair Business User*. If readers would like details of their programs to appear regularly they can advertise in Sinclair Supermart at the back of the magazine.

Milk Round. Keeps a record of weekly or monthly transactions for up to 500 customers, and calculates and prints out customers' bills. For the 48K Spectrum from C J Wigg, Ty Dewi, Hook Norton, Banbury, Oxon OX15 5NF. Price £15.95 plus £0.50 p&p.

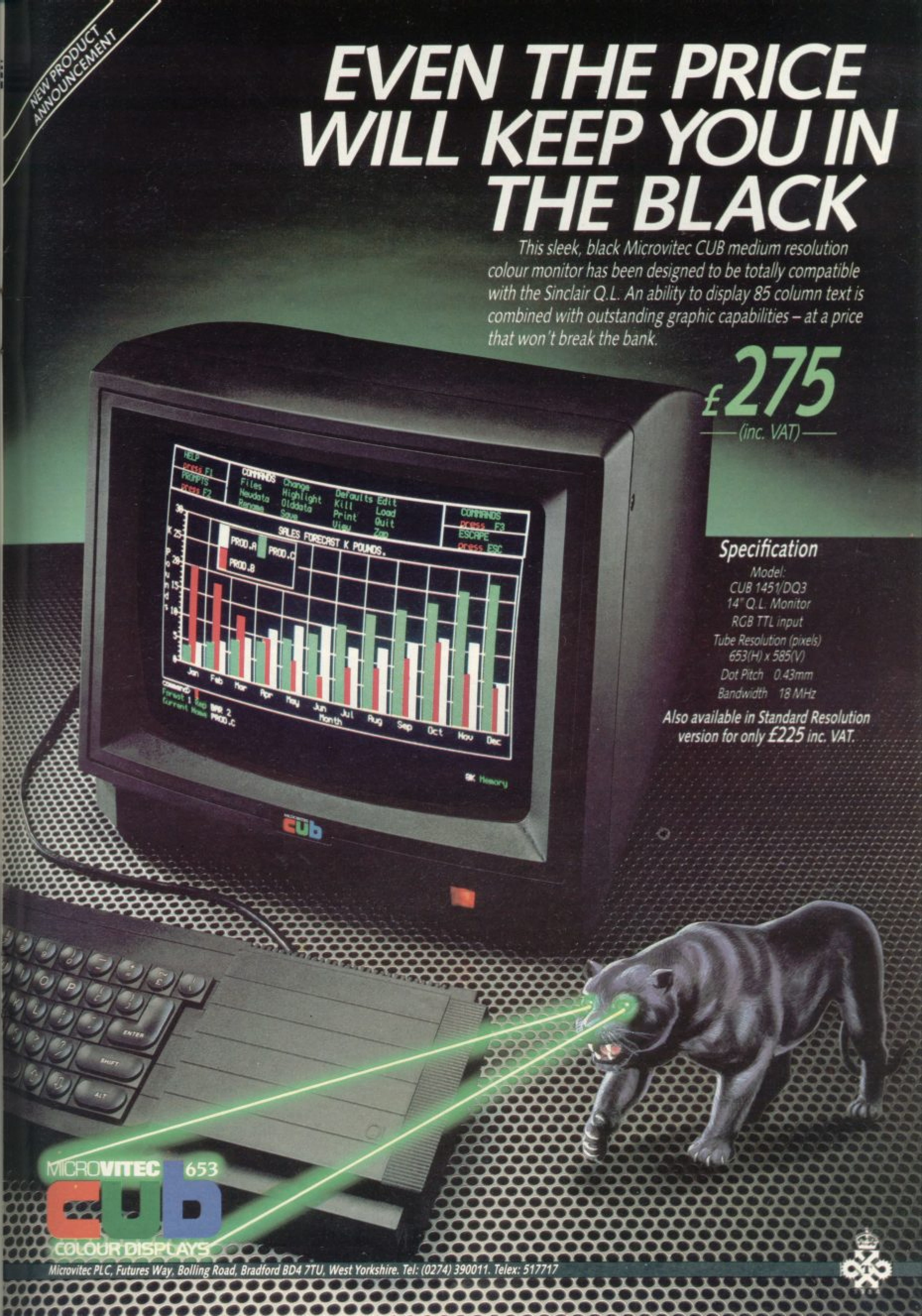
Dental Practice. A number of programs for the 48K Spectrum, covering expenses, recall system, wages, address book and a visual display for patient education. Available from W H Roberts, 23 Tan y Bryn, Penprisk, Pencoed, Mid Glamorgan CF35 6RT.

Hebrewtool. A within-program utility which facilitates the writing of Hebrew educational software, enabling the user to write Hebrew on screen. Also **Hebrew Writer** with supplement for the Currah Microspeech unit. Both for the 48K Spectrum, available from David Simon, 18 Velindre Place, Whitchurch, Cardiff CF4 2AN.

Jewish Calendar. A 48K Spectrum program which converts civil dates to the Jewish calendar and calculates Jewish holidays for the years 1845–2073. Available from Andrew Tuck, 52a The Vale, London NW11. Price £5.95.

Lighting Design. Calculates the number of light fittings required for a given area. Also available, **Point Source Illumination;** predicts amount of illumination available from different sources. On cassette or microdrive for the 48K Spectrum from Raymond Hoey, 1 Astley Grove, Stalybridge, Cheshire SK15 1NL.

Calculus. Gives numerical results for 1st and 2nd differential, maxima and minima, radius of curvature, involute/evolute; also area under curve, surface area, volume, length of arc, mean height. Prints out all values. Price £3.00 from N G Strong, 25 Albert Road, Epsom, Surrey KT17 4EQ.


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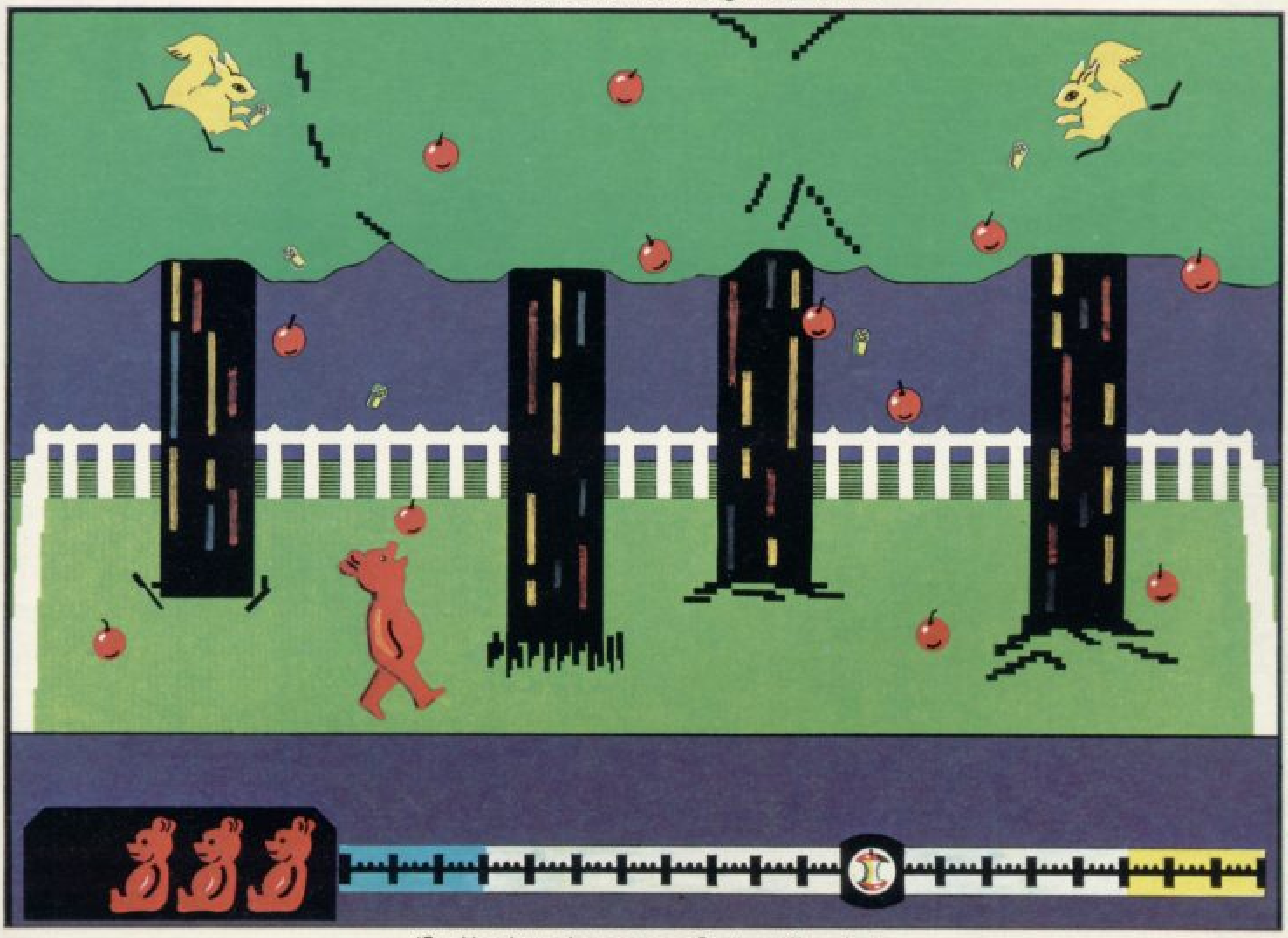
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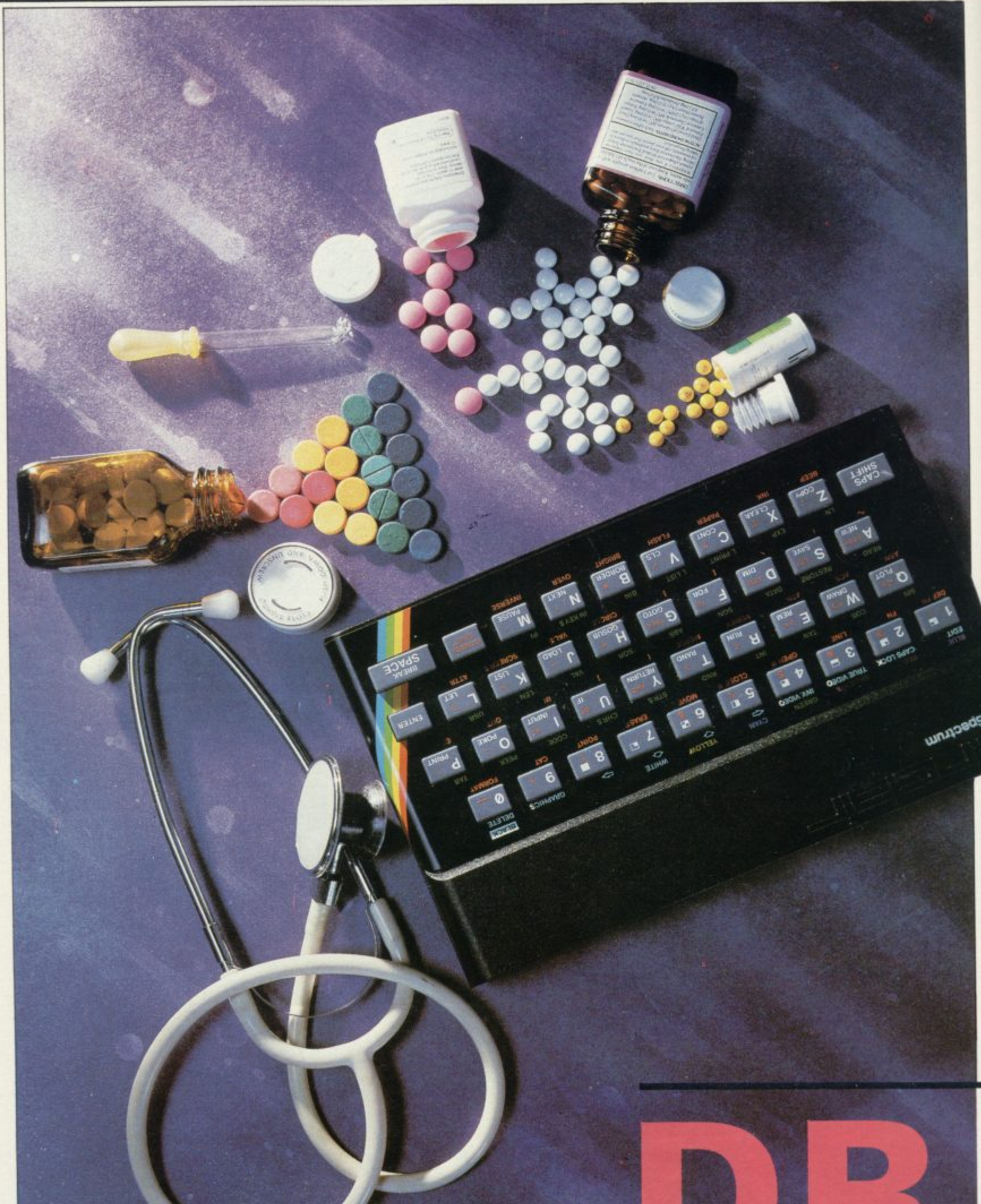
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DR

Micros provide a helping hand for medical doctors. Chris Bourne goes for a check-up

THE IDEA of computers playing a significant role in medicine either sends shivers down your spine or makes you feel the world is coming of age at last. Either way, you would imagine such computers to be on the large side, each controlling thousands of hospital records, linked together through some vast national network.

The more imaginative might see a future in which the examination and diagnosis of patients is carried out by computers. Expert systems already exist whereby doctors can feed in the results of tests and be presented with a list of the possible ailments that fit the symptoms and even the probabilites of each one being the true cause of the problem.

Such developments are a matter of concern to us all, and have their advantages and disadvantages. But it may come as a surprise to learn that the Spectrum, rubber keyboard and all, is spearheading the introduction of computers into the day-to-day running of the family GP practice.

Dr Peter Stott is one of the driving forces behind the micro-computerisation of medicine. A 34-year old GP with a practice in Tadworth in Surrey, he also holds a fellowship at the Department of Epidemiology and Primary Health Care at the University of Surrey.

"The success of the department is that everyone is a GP first. It gives us a firm base at the coal face," he says. Part of the department's work is involved with monitoring the spread of various diseases, which means using information technology. "It was obvious that one of us had to know something about what went on behind the keyboard." So Dr Stott bought a ZX-81 and began to find out. His first program, which he has since converted to the Spectrum, was a simulation of the spread of a disease through a school.

That first program was written three years ago; since then Dr Stott's programs have generated an extraordinary interest. Today, there are 200 doctors in the South West Thames region, which extends to the south coast, involved in a project on micros and medicine. There are also 150 trainees with hands on experience and 500 known users who receive all the programs. As if that were not enough, every GP in the country, all 26,000 of them, receives some of the programs through **Medikassett,** a promotional product from Winthrop Laboratories which combines educational articles with information about Winthrop medicines in the form of a cassette tape.

Perhaps the most extensive use of the computer is through vocational training courses. When a doctor qualifies he or she must undergo specialist training for a particular area of work. General Practitioners, during an extensive training period, must work with a qualified GP for one year, which involves practical work and tutorials. As an aid to the tutorials, Dr Stott has developed a wide series of programs, mainly based on a multiple choice format.

The programs are based around a core structure which can be modified to suit a particular subject. "The concepts behind the program are not medically specific," explains Dr Stott. Questionnaires range from general surveys of knowledge about drugs, or eye diseases, or diabetes to specific areas.

One particularly interesting program was in the form of a case history in which the patient — or computer — reveals various symptoms on her visits to the doctor and the doctor is asked to choose from a list of possible treatments or tests. The program is designed not merely to test knowledge of diseases, but to encourage the GP to select particular treatments.

"We have another which asks the students to rate their confidence on particular subjects, then groups the replies according to particular clinical areas. That helps us to design a curriculum for the individual student."

Some of the programs are more 'lighthearted'; one is a game in which the computer selects two drugs at random and asks whether there will be any side effects if the two are used in combination. "We play it at doctors' parties," he says, "with a five minute time limit on the number of questions."

The training programs first appeared two years ago, when Dr Stott obtained a Spectrum. "It got bigger and bigger, until eventually my secretary couldn't cope. At that point we began to make it more formalised."

Dr Heather Willson, Dr Stott's present trainee, is certainly enthusiastic: "It makes it more interesting," she says, "as well as fun."

Others are also enthusiastic; Glaxo, the giant drugs company, has provided the money for ten packages comprising Spectrum, cassette recorder and ZX-printer in a carrying case for use on vocational training schemes. Dr Stott envisages a future in which every trainee has some hands-on experience of home computers, whether or not they choose to use them in their practices later.

Programs with a practical use, as opposed to educational, are thinner on the ground. One such is an audit package. "The pundits in this profession are always interested in comparing individual doctors against a national average," says Dr Stott. The audit package allows doctors to input the statistics concerning their work; how many pregnancies, how many blood tests, how many cervical smears and so on. The computer plots the data against the national average and performs the χ^2 test to determine whether the difference is of statistical significance. Thus doctors can discover comparative details about their practice in private, without sending the data to an external company for processing.

But the most important use so far for

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the Spectrum is in the field of drug trials.

"When a drug is introduced it has to undergo tests of efficacy — it has already been tested for safety," says Dr Stott. "Side effects and efficacy differ greatly between hospitals and General Practice. Patients give up taking their pills in General Practice, but they don't in hospitals."

Patients who are in hospital are also more seriously ill, so that it is necessary to test the drug not only through the hospitals, which is relatively easy, but also in General Practice. Dr Stott conceived the idea of providing software to enable doctors to send the data in regularly via modem, enabling instant processing of the results and relieving the hard-pressed family doctor of some of the pressure of paperwork.

Drugs are also monitored through a Yellow Card system. Briefly, if a doctor has reason to believe a drug he has prescribed might have harmful side effects, he fills in a yellow card. Because the sytem is carried entirely on paper it takes at least three months for the data to pass through the system. Dr Stott argues that there is no reason why his system should not run alongside the old one. You only have to think of past controversies such as the Opren drug for arthritis to realise that any lessening of the delay in processing data on medicines has the potential to save lives as well as money.

You may wonder why all this has not been done before. The simple answer is money. GPs get a flat rate per patient with a guaranteed minimum salary. The Spectrum represents a cheap way of finding whether an individual doctor can benefit from using a home computer. Dr Stott also feels that by using a small computer doctors can get an idea of what they want from a bigger system, and can thus participate directly in the process of computerising the Health Service as a whole. Since most practices include three or four GPs, each Spectrum may be seen and used by a number of doctors.

Dr Stott has his criticisms of the Spectrum. "I still think they ought to put it in a decent box with a keyboard. It is so limited in credibility because of that. With a decent keyboard we could get patients using it." He is scornful of the BBC memory limitations, whereby so much of the 32K is used by the screen display, but says doctors will be interested in the QL "when we know it's reliable".

Interest in computers has also spread through Medikasset. Winthrop Laboratories, a drug company, had the idea of producing a cassette containing educational and advertising material to send to doctors. GPs receive mountains of promotional literature every week, and the cassette was an attempt to provide something different which could be listened to while driving or relaxing at home.

Jeff Woodruff, who runs the operation, explains that one of their designers in the company suggested putting programs onto Medikassett. "He brought in a small program and we put it through our bulk copying system. When the copy managed to load I was terribly impressed. We started looking around, heard of Dr Stott, and approached him. The first program was by a Dr Cordeaux from Gainsborough in Lincolnshire, but most of our programs have come from Dr Stott."



Dr Peter Stott

Winthrop took the project seriously enough to invite computer writer Ian Logan to advise them about possible uses for the machine. The programs, for a variety of computers, have been published for eight months now and have excited considerable interest.

"An amazing number of doctors are involved," says Woodruff. "The programs have even excited an interest in Winthrop — we have our own Spectrum club, although it is not specifically medical."

With all that activity, it was inevitable that sooner or later the Department of Health would become involved. The Micros for GPs scheme involves providing doctors with experience of home computers in an attempt to discover how useful the machines really are in General Practice. While the scheme continues the results are being kept secret, but Dr Stott knows of some doctors who have dropped out.

"We had trouble getting people into it at first," he says. It seems that although initial interest was strong, many doctors balked at having to learn something about programming. "The scheme hasn't drawn any high-powered enthusiasts so far." As the project involves 200 doctors there nevertheless seems a good chance enough will stay the course to provide a good indication of where the future lies.

Dr Stott believes that rather than opt for a large system the best use is to have several small ones. A QL might handle repeat prescriptions and patient records while a Spectrum could be used for educational programs and drug trials. He is not convinced that the Department of Health will see things the same way.

As far as the future goes, Dr Stott is already involved at the University of Surrey in plans for a ROM chip for the Spectrum which would transform it into an expert system. Present expert systems are involved in the diagnosis of symptoms such as chest or abdominal pains, but Dr Stott believes that learning systems probably have more relevance for the future. The expert system is one which has been pre-programmed with information about a particular subject and simply searchés for appropriate deductions to fit a given set of data.

"With the Bayesian learning system," says Dr Stott, "you sit down and decide what subject you want to look at. You first charge it with data, symptoms, case histories, and then you can get a probability on the implications of new data." Such a system increases in power the more information it is given, until eventually its ability to analyse new data in respect of its experience is as reliable as an expert system but with far greater flexibility.

Whatever the sophistication of such devices, Dr Stott is adamant that computers cannot replace any of the professional abilities of a human doctor. "We see computers in medicine as a diagnostic aid," he explains. "It doesn't take over from the doctor — it's a tool, like an X-ray machine."

Dr Stott believes we are at a turning point in medicine, as what began as a spare-time project three years ago has grown to an extent where the general use of micros by GPs is being seriously considered. He is anxious, however, to dispel fears that doctors may become technology-crazy. "Enthusiasts prefer computers," he says. "We actually like looking after patients."

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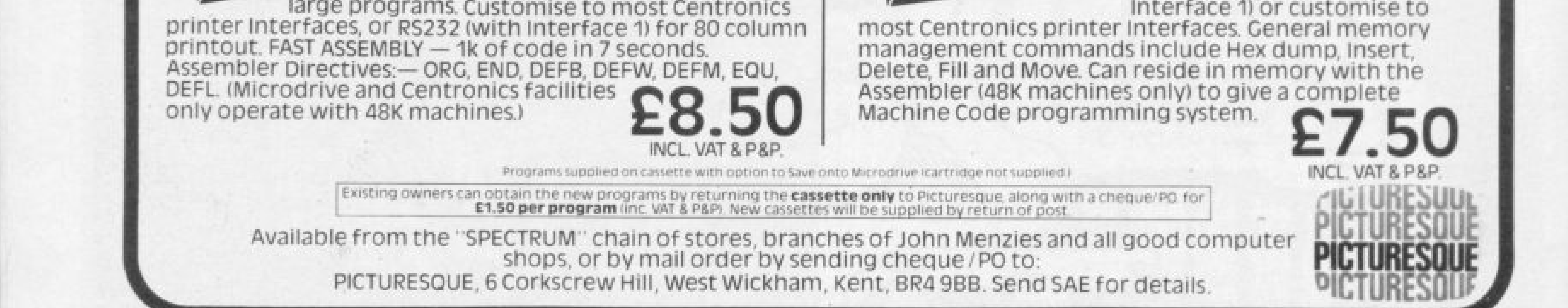
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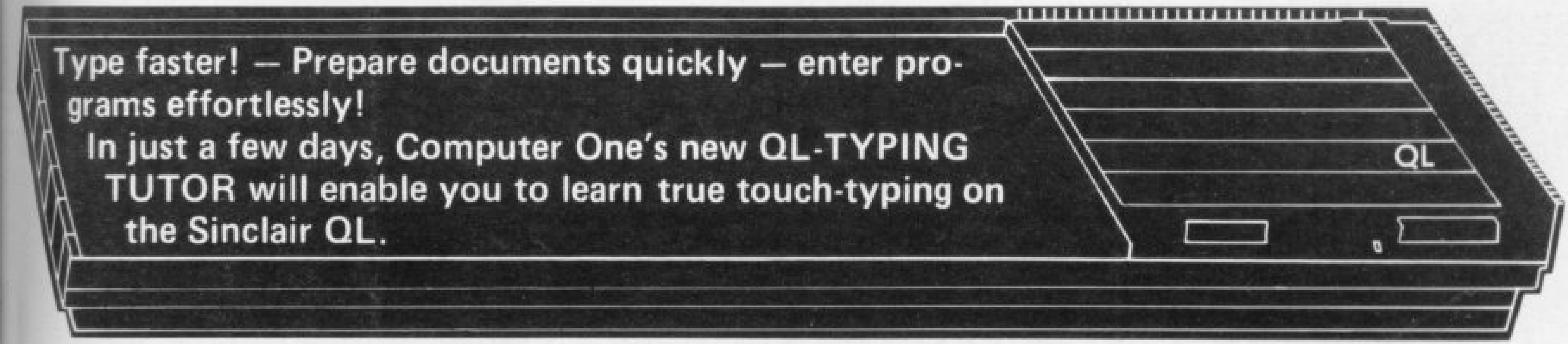
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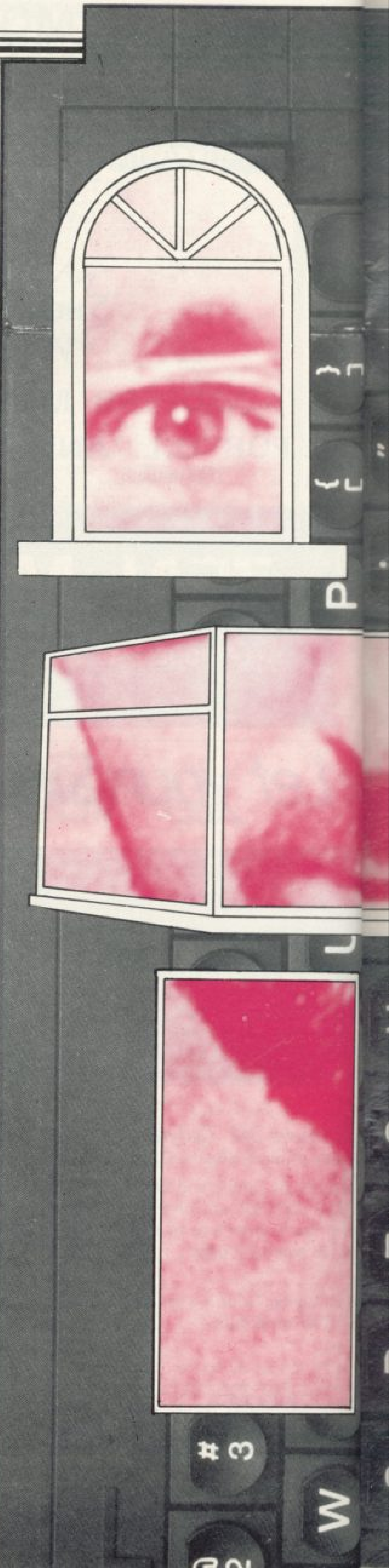
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John Gilbert demonstrates how to open windows on the QL and disproves the popular myth that they are necessarily linked with multi-tasking

Making the frame fit



IF YOU ASK anybody what a window does he would probably give one of two answers. The first would be that it lets light into a room and the second that it is something through which you can look onto another scene.

The latter is true of the window facility on the QL. You can define a window to look either at a SuperBasic listing or at the results of a program when it is run. QL windows are minature versions of the large screen display. Conversely, the latter is just another window which has been set up by the QL.

When the machine is switched on, or reset, it offers two display options. If you go into monitor, or 80-column, mode you will find that the screen is split into three windows. The one on the left shows the listing of a program and the one on the right produces the results when it is run. At the bottom of the display is the workspace window which is used for entering and editing SuperBasic text.

In television, or 40-column, mode the same windows are displayed in different positions. The workspace window still occupies the bottom of the screen but the listing and run windows have been merged. The run window has been put under the list window and only CLS # 2 or RUN. Both windows have been created so that they go into action when the relevant calls, RUN, LIST or CLS, are made to them.

Each window can be addressed using a number prefixed by a hash mark, such as # 2 which corresponds to the listing display. Those are channel numbers and by using them you can reference, OPEN and CLOSE data channels and streams.

You may know that the QL sets up its own channels to deal with microdrive operation and sending data to a printer. What may not be so obvious is that the screen is also treated as a device to which you can attach channels. The whole screen display consists of one big window device which is produced on the screen using the OPEN command.

The channel number, attached by means of a hash mark to the OPEN instruction, must be within the range of zero to 15. That means that the QL will allow the use of 16 channels at one time. The QL uses channels zero, one and two to produce the editing, listing and runtime windows. When you are first experimenting with those numbers it might be best not to use those three values to OPEN or CLOSE channels.

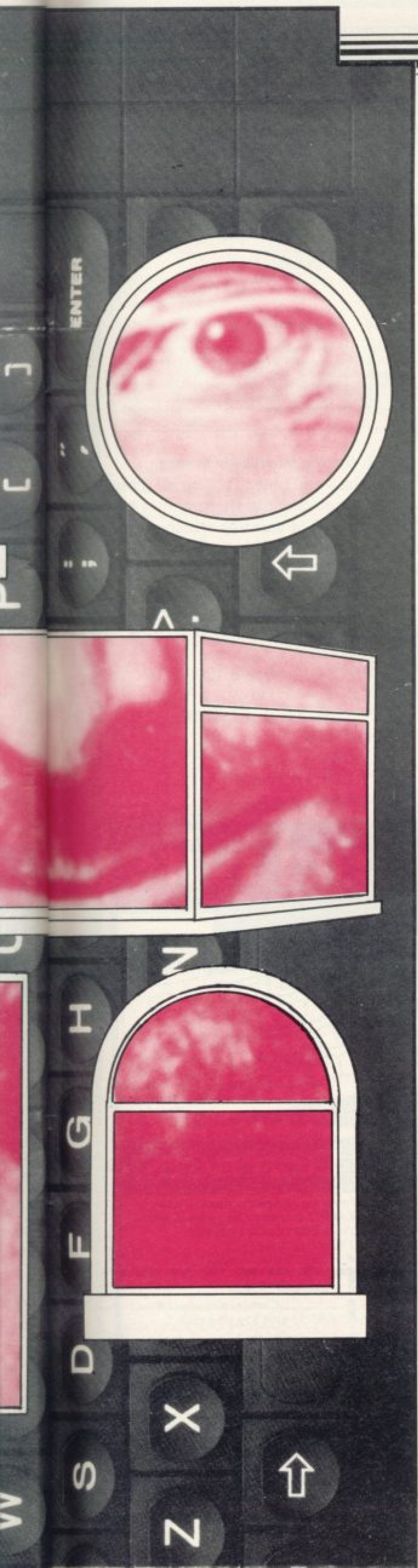
If, for instance, you closed channel zero, which is connected to the window through which the editing of instructions is done, you would be unable to type anything into the machine as window zero is used to accept your input from the keyboard. You can try it by using the instruction CLOSE # 0 but make sure that you have nothing important in the memory before you close off the vital visual link to the main processor. The computer will still accept information from the keyboard but that information will not be displayed.

The instruction for OPENing your own windows on the screen uses the format:

OPEN# channel_number, CON_width × height a horizontal × down.

CON tells the QL that the OPEN instruction is to be applied to a CONsole device which is an entry or exit point for a channel through which input and output can be accepted. Theoretically the microdrives can be set up as CONsole devices as they can accept input and output from a file in memory. In the same way a window can accept the input display of characters or graphics and output it onto the screen.

The four numeric values which follow CON_ set up the width and height



of the window followed, after the 'a', by the x,y co-ordinates at which it will appear on the screen. Windows are displayed using the pixel co-ordinate system which consists of 257 pixels running down the screen and 513 pixels running across the display from the lefthand side.

When you think about the positioning of a window it should be at least 32 pixels away from either edge of the screen. If it is not you will find that the window disappears off the edge of the display. The problem is that the QL screen format is larger than that with which a television can cope.

The origination point of any window is at its top lefthand corner. For instance, if you used the co-ordinates 50,50 that corner would be located at a point 50 pixels from the top of the screen and 50 across from the left. If a window is defined at that point you can safely give it a size of 130 pixels both in width and depth.

The instruction is:

OPEN # 3, CON_130x130a50x50

When opening the window through channel three make sure that you enter the 'x's and 'a's within the statement and not make the mistake of using commas which nearly all the other commands relating to SuperBasic graphics use. Think of the 'x' as meaning 'by' in carpenters' terms and 'a' meaning 'across the display' in terms of position from the top of the screen.

If you type in the OPEN # 3 statement as a direct command you will have to type in CLS and CLS # 3 to see the results of your work against the red background of the runtime screen. To see the effects of the windows on the screen you can define another window. Position it at 200,50 which is 150 pixels to the right of the first and give it the same dimension of 130,130.

OPEN # 4, CON_130x130a200 × 50

When you clear the screen again and then CLS # 4 you will see that the new window has appeared by the side of the first. You can give them different tasks to do and you will see that each responds almost immediately.

You can list a program in any window by typing the LIST instruction followed by the # suffix, which was used in the OPEN statement which defined it followed by its channel number. Enter the following program, or use one of your own, and then produce a listing of it in both windows # 3 and # 4.

```
10 PRINT # 0, "Sinclair User": Pause 50
20 PRINT # 0, "shows how to produce": Pause 50
30 PRINT # 0, "windows on": Pause 50
40 PRINT # 0, "the QL": Pause 50
```

If you type in the LIST commands on the same line, ENTERing them at the same time, you will see the delay between finishing one task in a window and starting another.

LIST # 3: LIST # 4

The delay and the way in which you entered the LIST instructions disproves the popular myth that windows and multi-tasking are somehow linked. As Sinclair Research has explained windows can be used to multi-task in machine code but just because you can output different listings and displays to windows you cannot run two programs concurrently in SuperBasic.

That is not to say windows are a waste of time when used within SuperBasic. You can, for instance, set up several display areas using windows some of which are used for the input of information, some for responses and some for displaying the status of the program. Such formats could be used in business programs, such as Archive and Easel, or in complex adventure games in which compartmentalised status displays are required.

The use of graphics within different windows is not as complex as it may seem in the User Guide. When the two windows # 3 and # 4 were defined the pixel co-ordinate system — Figure 1 — was used with a scale that ran down the screen from zero to 256. When producing graphics, such as lines, arcs and circles within a window you will need to use the graphics display co-ordinate system which exists in parallel with the pixel display — Figure 2.

It might seem complicated to have two systems operating on the screen to do different tasks but the graphics scale is more flexible than the pixel. The pixel scale is fixed but you can change the graphics scale from its default range of 0 to 100 co-ordinates to any other range. For instance, you could rescale it to 150 or 200.

You can see the change in scale by drawing a line up the lefthand side of window # 3. That is done by using the command

LINE 0,0 TO 0,100

The first set of values in the LINE command marks the x,y co-ordinates of the point of origin of the line and the last two are the destination co-ordinates. The scale has initially been set by the

continued on page 144

continued from page 143

QL at 100 and so the line should touch the top of the window display.

If, however, you change the scale the results will be different.

The instruction is:

SCALE # 3, 200,0,0

doubles the scale of the window # 3 to 200 instead of its original 100 pixels in depth. The whole window is affected by the change as you are using 0,0 co-ordinates as the start point of the change but you could make the scaling even more complex by starting the 200 scale somewhere else in the window which would leave the 100 scale still partially in effect. For instance, if you rescaled at 0,50 the new scale would come into effect halfway up the window.

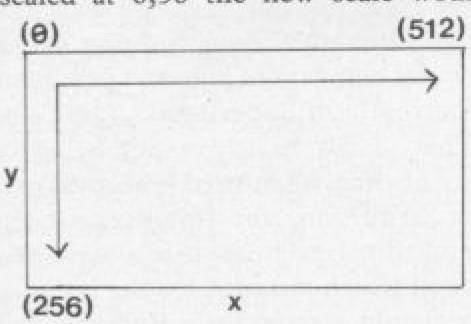


Figure 1. Pixel co-ordinate system.

When you have reset the range on the window type in the LINE command using 100 as its length. You will see that the line will now only go halfway up the window. The graphics system has been adapted for use with the 200 scale.

As well as redefining the SCALE with which window graphics can be plotted it is also possible to redefine the positions of windows, which either you or the QL have brought into existence, without using the CLOSE command to close a channel and re-opening it at another position. The instruction to do that is WINDOW and it will enlarge or shrink the existing window and relocate it on the screen if necessary.

You might, for instance, want to put the editing facilities of the window # 0 onto the main part of the screen so that it overlays both the runtime and the listing windows. That would mean you would have to CLS # 0 every time you wanted to bring the edit window to the top of the stack instead of relying on the QL to do it automatically.

The width of the redimensioned # 0 window would be 448 on the x-axis and 180 along the y-axis. The origination of the window is not as you might think 0,0 because of the obliteration problem mentioned earlier. It is 32 for the x-axis and 16 for the y-axis, counting down from the top of the screen. The full definition is:

WINDOW # 0, 448,180,32,16

You will find that once you have entered that as a direct command you will have a whole screen in which to edit information instead of the few lines given to you by the QL original editing window. Unfortunately it looks messy as you have three colours on the screen — red, black and blue. To clear all those problems you can use the program below to get rid of any text which might have been left at the bottom of the screen when you re-located window # 0. Make sure, however, that the first instruction in all your programs which use the technique is CLS # 0.

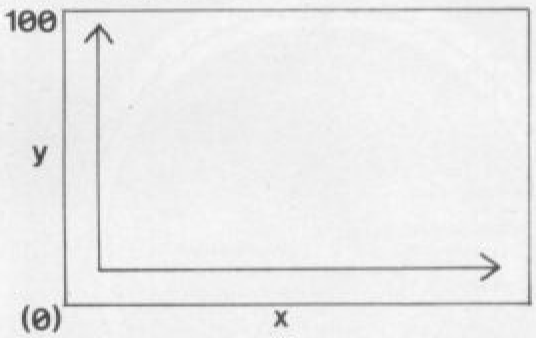


Figure 2. Graphic co-ordinate system.

```
10 CLS # 0
20 WINDOW # 0,448,180,32,16
30 FOR K= 0 TO 2
40 PAPER # K,0: CLS # K
50 NEXT K
60 CLS # 0
70 PRINT # 0,"ready"
```

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Data preservation

Andrew Hewson has some time SAVEing techniques

WHAT IS the method for deleting a ZX-81 program while preserving the variables and display? asks James Gilbert.

First you must note the line number of the first line of the program. Let us suppose it is line number 10. Then you can find the effective length of the program by entering:

PRINT PEEK 16396 + 256*PEEK 16397 − 16513.

Suppose the result is 1859. Then enter:

POKE 16511, 1859 − 256*INT(1859/256)

POKE 16512, INT(1859/256)

10 (or whatever was the first line number)

Do not attempt to LIST the program between entering the instructions or you will have to pull out the plug and start again. You are making the ZX-81 think that the whole program is one monster Basic line and if it attempts to LIST at all, it becomes confused. Entering 10, or whatever, deletes the monster line in the usual way.

David O'Brien of Belfast has written a program for his ZX-81 which he runs every month to update a numerical array. He has now accumulated a substantial amount of data in the array and he wishes to pass the data to a second program. Unfortunately there is no method built into the ZX-81, in contrast to the ZX Spectrum, for SAVEing an array on tape and then LOADing it into another program. He writes: **Can you save me the effort of typing all the figures again?**

There are two methods. The first is quick and elegant and consists essentially of writing new SAVE and LOAD routines in machine code. The second method is slow and clumsy but it is easy to understand and the necessary software is mostly in Basic, so I will explain it as the preferential method.

The steps, in outline, are:

1 — delete the original program whilst preserving the data using the method explained above; 2 — SAVE the data of interest on tape; 3 — LOAD the new program and copy it above RAMTOP to prevent it being subsequently overwritten; 4 — LOAD the data from tape in the usual way; 5 — create some space in the program area and copy the program into it from above RAMTOP.

The first step has been explained above and the second is straightforward — simply use the conventional SAVE command. Some odds and ends, including the display file, will be copied to tape along with the data required.

In step three be sure to move RAMTOP down as explained on page 168 of the ZX-81 manual before LOADing the new program. Then use the routine listed in Table 1 to copy the program above RAMTOP. The routine PRINTs the length of the program, J, in bytes. Make a note of it because it will be needed later.



• *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

In step four the data is LOADed from tape in the usual way. The new program will, of course, be over-written and so the final step is to copy it back from above RAMTOP. A machine code routine is needed for that step, because space must be created in the program area in which to store the program using a routine in ROM.

The routine is 20 bytes long and I suggest you store it at addresses 32748 to 32767 by entering and RUNning the following routine:

```
10 FOR I = 32748 TO 32767
20 INPUT M
30 POKE I,M
40 PRINT I, PEEK I
50 NEXT I
```

Enter the following numbers one by one from the keyboard:

42, 12, 64, 229, 43, 1, 0, 0, 197, 205, 158, 9, 193, 209, 42, 4, 64, 237, 176, 201.

You might like to determine how the routine works by translating the decimal numbers into Z-80 assembly language using Appendix A of the ZX-81 programming manual.

Before running the machine code routine, POKE the program length, J, into it by entering

POKE 32754, J − 256*INT(J/256)

POKE 32755, INT(J/256)

Then delete the Basic routine, put the ZX-81 into FAST mode, and call the machine code routine by entering

IF USR 32748 = 0 THEN STOP.

Marc Jones of Gotham, Nottinghamshire writes: **If after entering a program on my Spectrum, I POKE 255 into the first byte of the Basic area at address 23755, the program disappears. Why?**

To answer that I must first explain a little about how a program is held in the Spectrum. Enter the program listed in Table 2. The program will also work on the ZX-81 if line 15 is altered to read

15 LET s = 16509

Line 5 is a dummy line whose purpose is to allow the user to study the storage of numbers in programs.

The program lists the first 20 locations in the basic program area on the screen. The area starts at the address stored in PROG as may be seen from

continued on page 151

```
10  LET J = PEEK 16396 + 256*PEEK 16397 - 16509
20  PRINT J
30  LET K = PEEK 16388 + 256*PEEK 16389
40  FOR I = 0 TO J - 1
50  POKE K + I, PEEK (16509 + I)
60  NEXT I
```

Table 1. A ZX-81 routine to copy a program above RAMTOP.

```
5     LET A = 1
10    PRINT "BYTE";TAB 6;"CONTENTS";TAB 16;"
      CHARACTER"
15    LET S=PEEK 23635+256*PEEK 23636
20    FOR I=S TO S+20
25    PRINT I;TAB 8;PEEK I;TAB 20;CHR$ PEEK I
30    NEXT I
```

Table 2. A Spectrum program which looks at the first 20 bytes of the program area.

continued from page 149

the diagram on page 165 of the ZX Spectrum manual. PROG — that is the address of the basic program area, is found at 23635 and 23636, as may be seen on page 174 of the same book.

If the computer memory is cleared before the program is entered either by disconnecting the power supply temporarily or by entering NEW, the program area will contain that program only. Thus when the program is RUN it will be looking at itself. The results for the Spectrum and the ZX-81 are shown in Tables 3 and 4. The screen display shows, for example, that the fifth location contains the code for the LET command (241) followed by the codes for each of the three characters A, = and 1.

The first two bytes contain 0 and 5 respectively because those two bytes are used to specify the line number of the first line, the calculation being:

256 * first byte + second byte = line number

Experiment by POKEing new numbers into those two locations and then LISTing the program to see the effect. Try, for example,

POKE S, 10
POKE S + 1, 27
LIST

It will be seen that the line number of the first line is now 2587 because

256 * 10 + 27 = 2587

Notice that the order of the lines has not been changed and therefore it can be concluded that the Spectrum has taken no action as a result of the interference with the contents of the program area.

There are a couple of tricks worth mentioning. Try entering

POKE S, 39
POKE S + 1, 10
LIST

The first line number will now be 9994 because

39 * 256 + 10 = 9994

The largest line number allowed on Sinclair machines is 9999 so, it may be asked, what happens when an attempt is made to insert a larger line number? To find out enter:

POKE S, 40
LIST

The first line number is now shown as :250 whereas we would have expected it to be

40 * 256 + 10 = 10250

Reference to the table of codes of the character set in Appendix A of the manual gives a clue to the situation. The table shows that the codes for the digits 0 to 9 are 48 to 57 and they are followed by the codes for the colon, semi-colon, and so on. The Spectrum is programmed to expect line numbers to contain at most four digits. When it finds a line number which should have five digits it uses a single letter from the characters following the numbers in the table to represent the first two — : to represent 10, ; to represent 11, < to represent 12, etc.

Provided the line numbers are kept in order programs can be written to use line numbers up to 16383 (which appears as @383). Fortunately, the machine will accept 'incorrect' instructions like

GOTO 12530

which makes writing such programs easier than it would otherwise be.

Attempting to POKE in line numbers greater than 16383 causes the program display to disappear as Marc discovered. To see the effects enter

POKE S, 99

The program no longer functions although it is still present in memory as can be seen by entering

POKE S, 0

Finally, I have to apologise for an error in the program printed in table 1 of the July issue of *Sinclair User.* Unfortunately I omitted the following line:

1 DIM s$(200,5)

Thank you to everyone who wrote pointing out the omission and apologies to all who failed to get the program to work.

Incidentally the program is slow to execute — because it is written in Basic — and appears to stop with the job half finished. In fact it is busy thinking and will carry on eventually if left to its own devices.

BYTE	CONTENTS	CHARACTER
23755	0	?
23756	5	?
23757	11	?
23758	0	?
23759	241	LET
23760	65	A
23761	61	=
23762	49	1
23763	14	?
23764	0	?
23765	0	?
23766	1	?
23767	0	?
23768	0	?
23769	13	

Table 3. The first 15 lines of the screen display produced when the program in Table 2 is executed.

BYTE	CONTENTS	CHARACTER
16509	0	
16510	5	
16511	11	"
16512	0	
16513	241	LET
16514	38	A
16515	20	=
16516	29	1
16517	126	?
16518	129	
16519	0	
16520	0	
16521	0	
16522	0	
16523	118	?

Table 4. The first 15 lines of the screen display produced when the program in Table 2 is adapted for the ZX-81. The graphics characters on the second and tenth lines have been omitted for clarity.

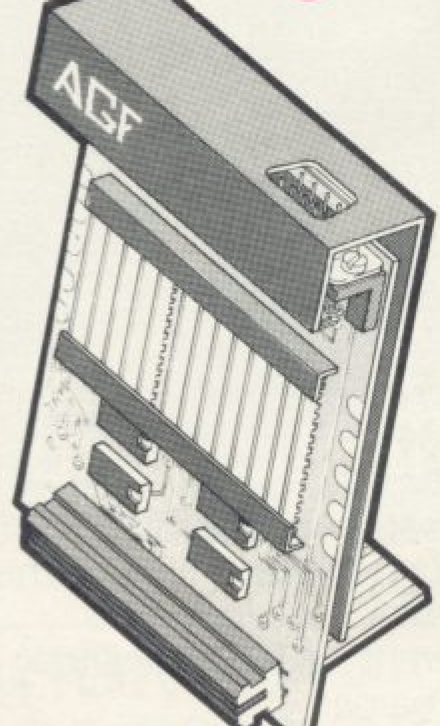

fantasy
SOFTWARE
"Ziggy turned, his fingers clutching the trigger of his capsule gun, something had startled him or had it?
He looked back, he had grown very tired from his many exploits in THE PYRAMID negotiating 120 different chambers and coming face to face with some pretty nasty aliens.
No sooner than he had accomplished this mission, he was summoned by Time Lord Hamilton (known as Super Ham to his friends) to go to DOOMSDAY CASTLE and to save the Universe from the infinitely evil Scarthax, this being no small task took several megayears. By this time Ziggy was completely exhausted, his capsule battered, dented and wobbling as he limps in the direction of home, a real super hero of our time. Unable to leave the Universe undefended he radioed his great friend and colleague Beaky on the planet of Crackit to stand guard until his return.
Beaky would normally assume this role without a second thought, however he had his own problems to face for the dreaded Eggsnatchers had returned to threaten the very existence of his breed. Beaky's survival instincts do not allow him to leave Crackit until he has reared enough chicks to fight off the Eggsnatchers. In order to crack it, he must pass through 12 different stages each getting progressively harder.
So we have it, Ziggy returning home for a complete refit under the illusion that Beaky is defending the Universe, surely it can't take Beaky that long to secure his own species and when will Ziggy be back.....?"
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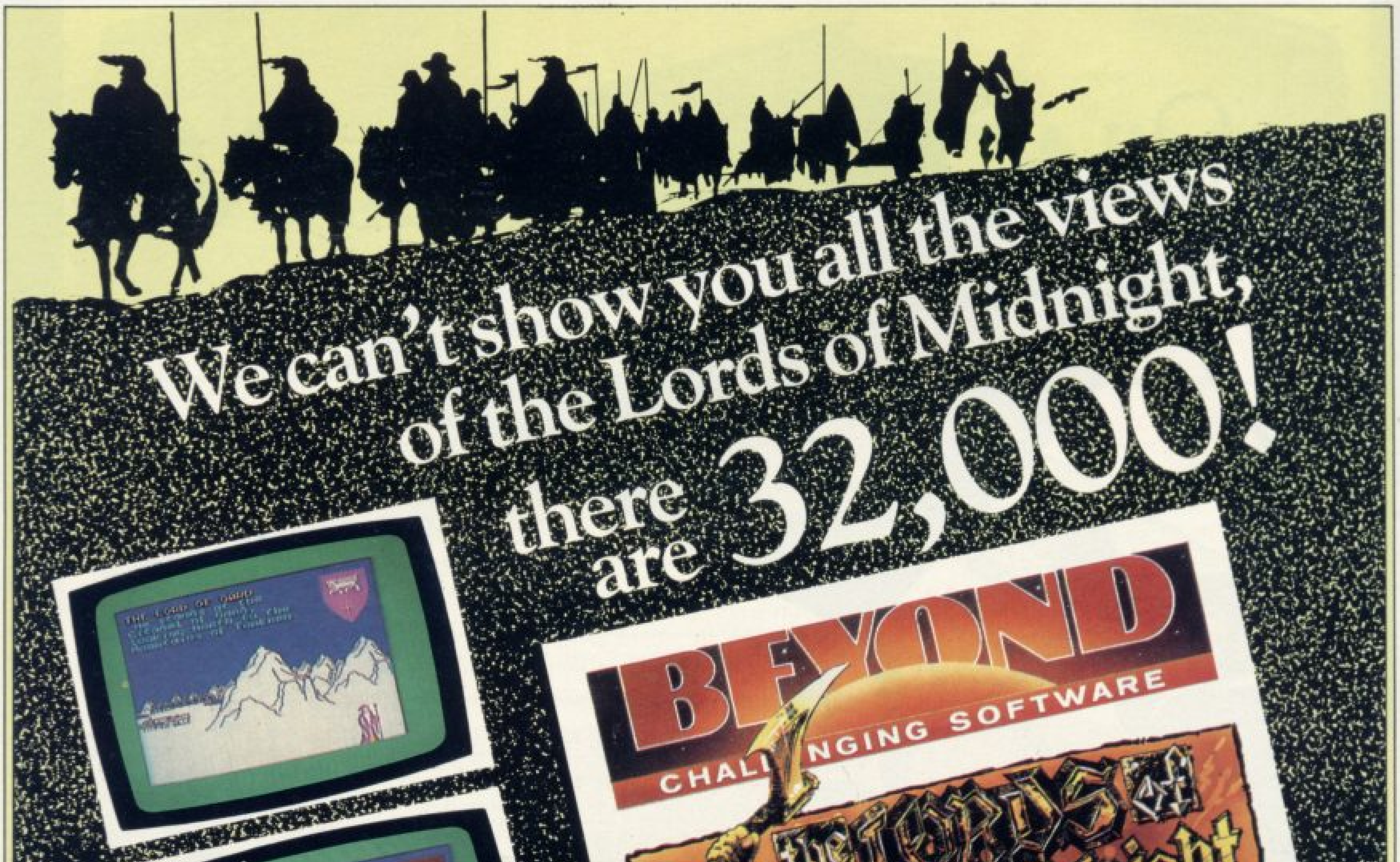
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Hero needed—must conform

Quentin Heath examines his attributes and explains how to develop real character

IN THE AUGUST issue of *Sinclair User* I explained the techniques used by computers which enable them to react intelligently when playing strategy games.

The rules of play outlined in that issue are almost the same when applied to adventure gaming but the ways in which they are applied are substantially different. Most strategy games rely on objects which have a strict relationship with the positions which they occupy and those of the enemy pieces. In adventure games the programming problem is just as complex but the extra factor of characterisation has also to be introduced. Those new factors create several complications for adventure programmers which are:

1—Interaction between character and object;
2—Interaction between objects;
3—Interaction between characters.

It is possible to treat characters as objects so that they are just moved around the adventure world but if you want to include the third factor, interaction between characters, within an adventure then you need some code which stimulates emotions, intellect, and action for each character. The simplest way to do that is to create a character matrix in which a numeric representation of a character can be built.

Most of the planning of such a matrix is done on paper. A list of the characteristics is compiled. It includes the normal role-playing devices, such as strength and endurance, but also includes personality traits such as how 'lawful' or 'unlawful' a character can be, whether they can accept defeat easily, how intelligent they are and in which areas they can appear in the adventure. The final criteria, dealing with habitat, is important as you do not want a monster such as a giant fish to appear flying through the air or finning its way through the desert.

SLAYMOR	
Endurance	+3
Strength	+1
Lawful	+6
Intelligent	+6

Figure 1a.

The list of traits does not have to be long and you could probably produce some interesting characters with those listed above. The complex part of the operation involves programming the computer to make characters react in a believable way to the situations in which they are placed.

For instance, if the programmer measures the character attributes on a scale of (−10) to (+10) the computer might assign traits for characters such as those in figure one. At the bottom end of the scale (−10) the character lacks or has the reverse of a stated trait. At the other end of the scale (+10) the character will exhibit an extreme manifestation of the trait in certain situations.

Figure 1a shows Slaymor, who is a law-abiding peasant from the Dark Vale and figure 1b shows Stab, an evil stoat from Iminsane. In the current game location, a blasted heath where King Lear would have been at home, the two characters meet. Stab has just had a bout at the local inn and has run out somewhat the worse for wear. As a result his endurance score is down but his strength remains at a good level, (+3). As he is the character controlled by the computer the program must decide whether a fight should take place.

When the two characters meet the computer examines the Lawful traits of each and finds that Stab is evil because he has (−4). A plus and a minus never mix so a fight is likely to occur. The computer then takes Endurance and Strength into account. Stab's Endurance is low but his Strength is high. A further decision is needed and consequently the computer looks to see just how much Good Sense Stab has. Unfortunately, he was born with little brains; a fight is now inevitable because of the results obtained from the character matrices. A human player might believe that Stab is reacting intelligently but the computer is merely examining numbers in order to arrive at a decision.

Interaction with objects is dealt with similarly. If you want another character to pick up a dangerous object for you he might decline either because the object is too heavy or because that character possesses enough sense not to touch an object which might endanger life. The Good Sense trait is brought into play here. If it is low, as it is for Stab in figure 1b, the character would pick up the object perhaps for no other reason than greed if the Lawful trait is not dominant.

The technique is simple but very powerful when applied and it is also easy to code into a program. All that is required is to put the matrices into the equivalent of arrays, or data tables in machine code, and then use decision-making statements, such as IF . . . THEN in Sinclair Basic.

The power of the technique is in its simplicity and the only hard work which is necessary is in covering all possible areas in which all characters will require intelligence during an adventure. That will depend upon the plot and the incidents which are experienced. It is not a case of discovering how each character will react when confronted by another but more a case of looking at an individual's traits and how you would like them to behave as a character. The computer will do the rest when encounters occur.

STAB	
Endurance	−1
Strength	+3
Lawful	−4
Intelligent	−3

Figure 1b.

Some characters will be more developed than others at the start of the adventure but there is no reason why that should not change and the weak become strong. A powerful enemy can be realistically reduced to a gibbering idiot when the character matrix rules are followed. In the same way an ignorant peasant, such as Slaymor, can gain strength in all traits and become powerful. The programmer might also note that the more powerful Slaymor becomes the greater the possibilty that he uses those powers for corrupt ends.

It is possible, therefore, to use simple techniques as decision making with a matrix and turn a mundane adventure into something approaching **The Hobbit** and with a great deal more potential.

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Club Corner

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If we have reviewed a program we have given it a rating known as the Gilbert Factor, named after our Software editor, John Gilbert. That factor includes clarity of instructions, speed of operation, ease of use, originality, lasting appeal, use made of graphics and sound, and success in accomplishing stated aims.

ZX-81

Adventure

Adventure	Bug-Byte	6
Adventure 1	Abersoft	6
Black Crystal	Mastervision	7
Dungeons of Doom	Woosoft	*
Espionage Island	Artic	*
Greedy Gulch	Phipps	7
Inca Curse	Sinclair	*
Knight's Quest	Phipps	*
Lost Island	JRS	*
Magic Mountain	Phipps	*
Merchant of Venus	Crystal	7
Pharoah's Tomb	Phipps	*
Pimania	Automata	6
Secret Valley	Newsoft	*
Serpents Tomb	Vortex	*
Ship of Doom	Artic	7
The Great Western	New Soft	*
Time Bandits	New Soft	*
Tomb of Dracula	Felix	*
Trader Trilogy	Quicksilva	6
Volcanic Dungeon	Mastervision	5
World of Illusions	Contrast	4

Arcade

Alien Dropout	Silversoft	*
Asteroids	Silversoft	8
Asteroids	Software Farm	6
Astral Convoy	Vortex	*
Bank Robber	Romik	6
Bears in the Wood	Unicorn	6
Bubble Bugs	Romik	6
Byter	Protek	*
Cassette 1	Orwin	7
Cassette 2-5	Orwin	7
City Patrol	Sinclair	7
Damper	Quicksilva	7
Defenda	Quicksilva	8
Door Slammer	Cathedral	7
Forty-Niner	Software Farm	9
Froggy	DJL	7
Full-screen Breakout	New Generation	*
Galactic Trooper	Romik	6
Galaxians	Quicksilva	6
Galaxy Jailbreak	Romik	6
Games 2	JRS	*
Games Tape 1	J K Greye	*
Games Tape 2	J K Greye	*
Games Tape 3	J K Greye	*
Gamestape 1	Fawkes Computing	7
Glooper	Quicksilva	7
Gloops	Quicksilva	5
Gobbleman	Artic	*
Gobbler	Software Farm	*
Grand Prix	dk'tronics	*
Gulp 2	Campbell	*
Hang Glider	S Electronics	6
Hickstead	CCS	5
High-resolution Invaders	Odyssey	*
Invaders	Abersoft	*
Invaders	Bug-Byte	5
Invaders	Odyssey	8
Invaders	Selec	7
Invaders	Silversoft	*
Krazy Kong	PSS	*
Maze Death Race	PSS	*
Maze Man	Abersoft	*
Mazogs	Bug-Byte	8
Micro Mouse	Lothlorien	7
Namtir Raiders	Artic	8
Night Gunner	Digital Integration	5
Puckman	Hewson	*
Sabotage	Sinclair	6
Six Games	A Stubbs	5
Space Raiders	Sinclair	*
Space Trek	JRS	*
3D Monster Maze	New Generation	9
Three Games Cassette	McGraw Hill	8
Zuckman	DJL	8
ZX Invasion Force	Artic	*
ZX Panic	Selec	4
ZX-81 1K Games Pack	Crystal	9
ZX-81 Pocket Book	Phipps	*

Business

Accounts (Limited company)	Hestacrest	*
Accounts (Sole Trader)	Hestacrest	*
Business Bank Account	Transform	*
Critical Path Analysis	Hilderbay	6
Draft	Myrmidon	*
Mailing List	Hestacrest	*
Payroll	Hilderbay	*
Payroll	Soft Tech	*
Payroll	Soft Tech	*
Payroll	V&H Computing	*
Personal Banking System	Hilton	*
Purchase Ledger	Hestacrest	*
Sales Day Book	Transform	*
Sales Ledger	Hestacrest	*
Text	Contrast	8

Education

Calpac 1-2	Calpac	*
Four Rules of Number	Micro Master	*
Integration	University	8
Intermediate English 1-2	Rose	*
Intermediate Maths 1-2	Rose	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Linear Programming	University	*
Matrix Operations	University	7
O Level Chemistry	Calpac	*
O Level French Revision	Rose	*
O Level Maths Revision	Rose	*
Polynomials	University	*
Primary Arithmetic	Rose	*
Regression	University	*
Self-teach Program	Anvil	*

Language

Forth	Sinclair	7
ZX Forth	Artic	8

Practical

Ephemeris	Bridge	7
Football Pools	Hartland	*
Poolster	Naigram	3

Puzzle

Nowotnik Puzzle	Phipps	*
Word Fit	Ram Writer	6

Simulation

Fighter Pilot	Digital Integration	5
Flight Simulation	Sinclair	6
Pilot	Hewson	7
Print Shop	CCS	*

Strategy

Airline	CCS	7
Auto Chef	CCS	7
Battleships	JRS	*
Conflict	Martech	7
Cyborg Wars	Stratagem	7
Dallas	CCS	6
Dictator	Bug-Byte	7
Farmer	CCS	*
Football Manager	Addictive Games	7
Fort Apache	Contrast	8
Galaxy Conflict	Martech	8
Great Britain Ltd	Hessel	*
Ocean Trader	Quicksilva	7
Pioneer Trail	Quicksilva	7
Racehorse Trainer	G Barker	6
Racing League	Racing League Software	4

Traditional

Do Not Pass Go	Work Force	*
Lynchmob	Bridge	6
Original Superchess	CP Software	*
Tai	PSS	*
Tenpin	Phipps	*
ZX 1K Chess	Artic	*
ZX Compendium	Mastervision	7
ZX-Chess I	Artic	*

Utility

Graphics	IPA	*
Graphics Toolkit	JRS	9
HI Resolution	CRL	6
Machine Code Test Tool	OCP	*
MCoder	PSS	8
Programme Enhancement Package	R and R	*
Renumber Delete	Work Force	*
Trace	Texgate	7
ZX Compiler	Silversoft	*
ZX Screenkit	Picturesque	*
ZX-81 Remload	Picturesque	*
ZX-Bug	Artic	*
ZX-sideprint	Microsphere	*
ZXAS	Bug-Byte	*
ZXDB	Bug-Byte	*

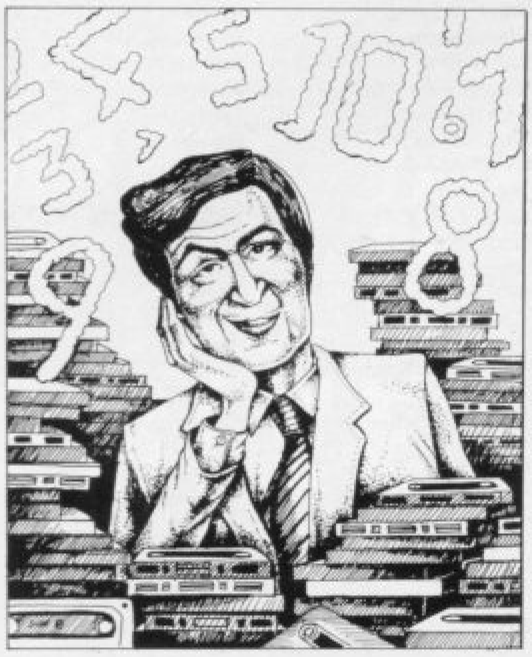
SPECTRUM 16K

Adventure

Android One	Vortex	*
Escape	New Generation	8
Mines of Saturn/Return to Earth	Mikro-Gen	*
Moria	Severn	*
Planet of Death	Artic	6
Secret Valley	New Soft	*
The Great Western	New Soft	*
Time Bandits	New Soft	*

Arcade

Aquarius	Bug-Byte	6
Arcadia	Beau Jolly	5
Arcadian	J K Greye	6
Assassin	Spectrasoft	*
Avenger	Abacus	5
Baron	Temptation	*
Base Invaders	Imagination	*
Black Hole	Quest	6
Blind Alley	Sunshine	7
Bug Blaster	Crystal	*
Cassette A	Orwin	*
Caterpillar	CDS	*
Cavern Fighter	Bug-Byte	4
Centi-Bug	dk'tronics	*
Children's Compendium	Dymond	*
City Defence	Mikro-Gen	*
Colour Clash	Romik	4
Cookie	Ultimate	*
Cosmic Guerilla	Crystal	8
Crazy Cranes	Voyager	5
Creepy Crawler	Mikro-Gen	*
Crevasse and Hotfoot	Microsphere	7
Cruising	Sunshine	4
Cyber Rats	Silversoft	7
Death Chase	Micromega	6
Demolition	Comp. Rentals	*
Destroyer	Winters	*
Di-lithium Lift	Hewson	3
Digger Dan	Ocean	*
Doombugs	Work Force	8
Dymonoids	Dymond	*
Earth Defence	Artic	5
Ed-On	Add-On	4
Eskimo Eddie	Ocean	*
Family Games Pack	Hornby	*
Fireflash	Abacus	5
Froggy	DJL	7
Fruit Machine	dk'tronics	6
Galactians	dk'tronics	*
Galactic Trooper	Romik	3
Galactic Warriors	Abacus	6
Galaxians	Artic	6
Ghost Hunt	PSS	*
Gnasher	Mastertronic	4
Gobble-a-Ghost	CDS	*
Gobbleman	Artic	*
Godzilla and Martians	Temptation	7



Ground Attack	Silversoft	6
Gulpman	Campbell	*
Haunted Hedges	Micromega	6
Hopper	PSS	6
Horace and the Spiders	Sinclair	8
Horace Goes Skiing	Sinclair	8
Hungry Horace	Sinclair	8
Invasion Force	Artic	8
It's the Wooluf	Crystal	5
Jet Pac	Ultimate	8
Labyrinth	Axis	4
Leap Frog	CDS	*
Light Cycle	PSS	*
Luna Crabs	Micromega	7
Magic Meanies	CDS	2
Maze Chase	Hewson	8
Meteor Storm	Quicksilva	7
Meteoroids	dk'tronics	7
Meteoroids	Softek	6
Micro Mouse	Lothlorien	6
Millypede	Add-on	7
Mined Out	Quicksilva	7
Moon Buggy	Visions	6
Mr Wong's Loopy Laundry	Artic	6
Muncher	Silversoft	*
Muncher	Silversoft	6
Nanas	Mikro-Gen	*
Orbiter	Silversoft	7
Ostron	Softek	*
Pengy	Micromania	4
Pitman Seven	Visions	*
Planetoids	Sinclair	8
Proteus	Abacus	5
Rapedes	Visions	*
Repulsar	Softek	*
Rider	Virgin	6
Road Toad	dk'tronics	7
Robot Panic	Soft Mill	1
Sam Spade	Silversoft	5
Santa	Artic	*
Sentinel	Abacus	7
Shark Attack	Romik	5
Sheer Panic	Visions	7
Slippery Sid	Silversoft	8
Space Fighter	Winters	*
Space Intruders	Quicksilva	7
Space Lanes	Cathedral	*
Space Raiders	Sinclair	6
Space Zombies	Mikro-Gen	*
Spec. Frogs/ Showdown	Artic	*
Spec. Gobbleman	Artic	*
Spec. Invaders	Artic	*
Spec. Invasion Force	Artic	*
Spec. Scramble	Work Force	7
Spectipede	Mastertronic	5
Spectral Invaders	Bug-Byte	8
Spectral Panic	Hewson	5
Spectres	Bug-Byte	6
Strike Four	Spectresoft	4
Styx	Bug-Byte	7
Sub	Romik	*
Tank Battle	dk'tronics	8
3D Monster Chase	Romik	3
Train Game	Microsphere	9
Trom	dk'tronics	4
Vortex	JK Greye	5
Winged Warlord	CDS	6
Wizard's Warriors	Abersoft	*
Yomp	Virgin	7

Business

Finance Manager	OCP	9
Home Computer Pack	SD Micro	*
Masterfile 16	Campbell	*
Matcalc	Work Force	*
Micropen	Contrast	*
Vu-Calc	Sinclair	7
Vu-File	Sinclair	8

Education

Alphabet	Widget	*
Alphabet Games	Sinclair	*
Apostrophe	Sinclair	7
Ballooning	Heinemann	*
Calpac 1-3	Calpac	*
Car Journey	Heinemann	*
Cargo	Sinclair	*
Chess Tutor	Artic	7
Counting	Starter Soft	*
Counting	Widget	*
Education One	Lerm	*
Educational	Startersoft	*
Firework Music	Soft Cottage	8
First Numbers	Collins	*
40 Education Games	Granada	*
Four Rules of Number	Micro Master	*
French Voc Test	Tutorial	*
Hidden Letters	Poppy	*
Hot Dot Spotter	Longman	*
Integration	University	8
Intermediate English 1-2	Rose	*
Intermediate Maths 1-2	Rose	*
Know Your Tables	Collins	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Learn Basic	Logic 3	*
Learning Read 1	Poppy	*
Linear Programming	University	*
Marks Book	Lerm	*
Maths Invaders	Stell	*
Maths Tutor	AD Software	*
Matrix Operations	University	7
Money	Poppy	*
Night Sky	Bridge	*
O Level Maths	Homestudy	*
O Level Physics	Homestudy	*
Paddington's Shopping Mix-up	Collins	*
Pathfinder	Widget	*
Polynomials	University	8
Pre/early school cassettes	Essex	*
Primary Arithmetic	Rose	*
Punctuation Pete	Heinemann	*
Regression	University	8
Self-teach Program	Anvil	*
Shape Sorter	Widget	*
Special Agent	Heinemann	*
Spellbin	Startersoft	*
Use and Learn	Microl	8

Language

Beta Basic	Betasoft	9

Practical

Biorythms	Spectrasoft	*
Countries of the World	Hewson	8
Cycle Planner	Medidata	4
Map of the UK	Kuma	7
Shopping List	SD	*
Spectasort	Spectadraw	4

Puzzle

Flippit	Sinclair	7
Hanoi King	Contrast	7
Lojix	Virgin	3
Nowotnik Puzzle	Phipps	7
Quazar	Rose	4

Simulation

Air Traffic Controller	Hewson	6
Airliner	Protek	6
Golf	R & R	7
Golf	Virgin	7
Golf	Virgin	8
NightFlite	Hewson	5
Print Shop	CCS	8
Pro-Golf	Hornby	7

Strategy

Auto Chef	CCS	*
Big Match Soccer	Winters	*
Dallas	CCS	6
Dictator	dk'tronics	*
Farmer	CCS	*
Football	Winters	*
Heathrow	Hewson	8
Las Vegas	Temptation	*
Quincy	Severn	*

Traditional

Backgammon	Hewson	*
Bridge Tutor	CP Software	8
Bridgemaster	Bridgemaster	9
Challenge	Temptation	*
Gambling Tape	Dymond	*
Las Vegas	Temptation	5
Odds-on	RSD	*
Othello	CP Software	*
Pinball	Winters	*
Pool	Bug-Byte	7
Reversi	Sinclair	8
Roulette	Newsoft	*
Solo Whist	Video Soft.	*
Spec. Microchess	Artic	*
Super Play I	Video	*
Tennis	Winters	*

Utility

Aspect	Bug-Byte	5
Audio Sonics	Work Force	4
Auto Sonics	Buttercraft	5
Basic Utilities	Jaysoft	6
Character Generator	Spectrasoft	*
Dietron	Custom	6
Disassembler	dk'tronics	7
Display	Work Force	*
Editor/Assembler	Picturesque	8
Extended Basic	CP Software	7
FP Compiler	Softek	9
Friendly Face	Monitor	4
Keysounder	S and G	*
Letterfont	Allanson	8
Machine Code Test Tool	OCP	7
Master Toolkit	OCP	7
MCoder	PSS	8
Micropen	Contrast	*
Print Utilities	Sinclair	7
Programmer's Dream	Work Force	8
Renumber Delete	Work Force	*
Slow Loader	ELR	9
Sound FX	dk'tronics	6
Spec. Bug	Artic	*
Spec. Editor/ Assembler	Picturesque	8
Spec. Monitor	Picturesque	7
Spectrum Super Toolkit	Nectarine	8
Spectsound	PDQ	2
Supercode	CP	8
Taswide-64	Tasman	*
Trace	Texgate	8
TT-S	Timedata	8
ZX Spectrum Assembler	McGraw Hill	4
ZXED	dk'tronics	*

SPECTRUM 48K

Adventure

Abyss	CCS	6
Ace in the Hole	Add-on	*
Adventure 1	Abersoft	6
Adventure Island	Contrast	*
Alchemist	Beau Jolly	7
Arcane Quest	Add-on	*
Atlas Assignment	Virgin	7
Black Crystal	Mastervision	7
Black Dwarf's Lair	New Soft	*
Black Planet	Phipps	7
Buffer Adventure	Buffer Micro	6
Byte	CCS	3
Castle	Bug-Byte	*
Castle Blackstar	SCR	7
Circus	Channel 8	8
Classic Adventure	Melbourne House	*

Colditz	Phipps	8
Colossal Caves	CP Software	8
Cry Wolf!	Add-on	*
Demon Lord	MCE	5
Detective	Arcade	7
Devils of Deep	Shepherd	*
Diamond Quest	CCS	4
Diamond Trail	Gilsoft	7
Dragonsbane	Quicksilva	6
Dungeon Master	Crystal Comp.	8
Dungeons of Doom	Temptation	3
Espionage Island	Artic	5
Everest Ascent	Sheperd	6
Fantasia Diamond	Hewson	7
Golden Apple	Artic	7
Gorgon	Phipps	*
Halls of Things	Crystal Comp.	9
Here comes the sun	Alligata	7
Hobbit	Melbourne House	9
Hole	Add-on	*
Horror Atoll	Add-on	*
Inca Curse	Artic	6
Inferno	Shepherd	7
Invincible Island	Shepherd	8
Island	Crystal	4
Island	Virgin	7
Jericho Road	Shards	7
Jungle Adventure	CCS	4
Knight's Quest	Phipps	6
Leopard Lord	Add-on	4
Lords of Midnight	Beyond	9
Lords of Time	Level Nine	8
Lost Over Bermuda	Add-on	*
Mad Martha	Mikro-Gen	7
Mad Martha II	Mikro-Gen	*
Mountains of Ket	Incentive	8
Murder at Manor	Gemtime	7
Mysterious Fairground	Buffer Micro	6
Odyssey of Hope	Martech	6
Oracle's Cave	Doric	8
Orb	Comp. Rentals	*
Paradox	Runesoft	2
Perseus and Andromeda	Channel 8	7
Pimania	Automata	7
Quest	Hewson	7
Quetzalcoatl	Virgin	8
Roundsby Incident	Add-on	*
Satan's Pendulum	Minatron	7
Sherlock	Melbourne House	9
Ship of Doom	Artic	7
Solaris	Softel	*
Spoof	Runesoft	7
Snowball	Level 9	9
Superspy	Shepherd	5
Temple of Vran	Incentive	8
Terror from The Deep	Add-on	*
Time Quest	Mikro-Gen	*
Titanic	R&R	5
Transylvanian Tower	Shepherd	7
Urban Upstart	Shepherd	*
Valhalla	Legend	7
Vampire Village	Terminal	4
Velnor's Lair	Quicksilva	8
Volcanic Dungeon	Mastervision	6
Width of the World	Mosaic	4
Wrath of Magra	Mastervision	8
Ziggarat of Dread	Add-on	*

Arcade

Ad Astra	Gargoyle Games	8
Adven. of a St Bernard	Mastertronic	7
Alcatraz Harry	Mastertronic	3
Android Two	Vortex	*
Ant Attack	Quicksilva	8
Antics	Bug-Byte	8
Arena 3000	Microdeal	5
Armageddon	Silversoft	3
Atic Atac	Ultimate	8
Automania	Micro-Gen	6
Base Invaders	Work Force	6
Bear Bovver	Artic	8
Birds and Bees	Bug-Byte	8
Blade Alley	PSS	6
Blue Thunder	Foundry Systems	6
Brain Damage	Silversoft	*
Bubble Buster	Sinclair	5
Bubble Trouble	Arcade	*
Bugaboo	Quicksilva	7
Butterfly	Pulsonic	4
Caesar the Cat	Mirrorsoft	7
Carnival	Eclipse	5
Carpet Capers	Termial	7
Cavelon	Ocean	7
Centipoid Plus 3	Orwin	5
Chequered Flag	Sinclair	8
Chuckie Egg	A & F	8
Chuckman	CCI/Add-on	8
Close-In	Pulsonic	4
Codename Mat	Micromega	9
Corridors of Genon	New Generation	9
Cruise Attack	Mikro-Gen	*
Cyber Zone	Crystal	*
Death Chess 5000	Artic	7
Defenda	Interstella	2
Deffendar	Mikro-Gen	*
Defusion	Incentive	6
Defusion/Worms	K-Tel	3
Demon	Microcosm	*
Demon Chase	Mansfield	4
Devil Rides In	Mastertronic	7
Dimension Destructors	Artic	8
Dinky Digger	Postern	4
Dodge City	Phoenix	7
Dr Franky and the Monster	Virgin	6
Driller Tanks	Sinclair	3
Elektro Storm	PSS	*
Energy 30,000	Elm	3
Eric and the Floaters	Sinclair	6
Eskimo Eddie	Ocean	4
Frank N Stein	PSS	7
Fred	Quicksilva	6
Freez Beez	Silversoft	*
Froot Loop	NTD Software	5
Galaxy Attack	Sunshine	4
Glug Glug	CRL	6
Harry Goes Home	Pulsonic	6
Hickstead	CCS	4
High Noon	Work Force	9
House of Living Dead	Phipps	*
Hunchback	Ocean	7
Invasion Body Snatch.	Crystal	9
Jack and the Beanstalk	Thor	5
Jackpot	Comp. Rentals	*
Jet Set Willy	Software Projects	9
Killer Knight	Phipps	5
Knight Rider	Hewson	*
Kosmic Kanga	Micromania	5
Krakatoa	Abbex	8
Krazy Kong	PSS	*
Laser Zone	Quicksilva	8
Laserwarp	Mikro-Gen	6
Last Sunset Lattica	Arcade	*
Lazatron	Contrast	*
Les Flics	PSS	6
Loony Zoo	Phipps	6
Lunar Jetman	Ultimate	8
Manic Miner	Bug-Byte	9
Matrix	Salamander	7
Maze Death Race	PSS	*
Maziacs	dk'tronics	8
Metagalactic Llamas	Salamander	8
Mission Impossible	Silversoft	6
Mission Omega	Pulsonic	4
Monkey Biznes	Artic	7
Moon Alert	Ocean	*
Moons of Tantalus	Cornhill	5
Mr Wimpey	Ocean	7
Mummy Mummy	Lothlorien	6
Munnery's Mergatroids	Abacus	6
1994	Visions	4
Olympimania	Automata	6
Orion	Software Projects	5
Paratroopers	Rabbit	4
Pat the Postman	Mikro-Gen	*
Pedro	Beau Jolly	7
Penetrator	Melbourne House	7
Pi-Balled	Automata	7
Pi-Eyed	Automata	6
Pingo	Profisoft	6
Psi-Spy	Postern	5
Pssst	Ultimate	7
Psytron	Beyond	9
Pyramid	Fantasy	8
Raider Cursed Mine	Arcade	*
Rapscallion	Bug-Byte	6
Reactor	Gemini	7
Rescue	Comp. Rentals	*
Rescue	Ocean	*
Revenge of the Killer Tomatoes	Visions	6
Rider	Virgin	6
River Rescue	Creative Sparks	3
Robot Riot	Silversoft	6
Rommels Revenge	Crystal	8
Sabre Wulf	Ultimate	8
Scuba Dive	Durrell	9
Security Shelter	Add-on	*
Skull	Games Machine	5
Sorcery	Virgin	7
Space Station Zebra	Beyond	6
Spectron	Virgin	6
Spellbound	Beyond	7
Splat	Incentive	8
Stop the Express	Sinclair	8
Submarine Strike	Pulsonic	6
Tank Trax	Mastertronic	3
The Guardian	PSS	6
The Pyramid	Fantasy	7
The Snowman	Quicksilva	8
3D Bat Attack	Cheetahsoft	6
3D Lunattack	Hewson	6
3D Seiddab Attack	Hewson	5
3D Star Wars	Add-on	1
3D Tunnel	New Generation	9
Time Gate	Quicksilva	8
Timebomb	CDS	7
Tobor	Add-on	7
Tornado Low Level	Vortex	8
Tranz Am	Ultimate	*
Trashman	New Generation	8
Traxx	Quicksilva	7
Tribble Trubble	Software Projects	8
Trom	dk'tronics	4
Tutankhamun	Micromania	8
Two-Gun Turtle	Lothlorien	7
Warlock of Firetop Mountain	Penguin	*
Wheelie	Microsphere	7
Worm Attack	Pulsonic	2
Worse Things Happen at Sea	Silversoft	7
Xadom	Quicksilva	4
Zig-Zag	dk'tronics	7
Zipper Flipper	Sinclair	4

Business

Account Management System	Fulwood	*
Accounts (Limited Company)	Hestacrest	*
Accounts (Sole Trader)	Hestacrest	*
Address File	SD Micro	*
Address Manager	OCP	7
Bank Account System	K Gouldstone	8
Bank Verifier	SD Micro	*
Business Bank Account	Transform	*
Cash Controller	Shepherd	7
Collector's Pack	Sinclair	7
Critical Path Analysis	Hilderbay	*
Database	Microl	7
DIY Book-keeping	RAMTOP	*
Heathplanner	Heath Computing	7
Investment, Insurance, Information	Inform	5
Masterfile	Campbell	8



Micropen	Contrast	5
Multi-File	ISP	6
Omnicalc	Microsphere	9
Payroll	Hilderbay	9
Payroll	Transform	*
Payroll	V&H Computing	*
Personal Banking System	Hilton	*
Personal Financ. Management Syst.	Fulwood	*
Sales Day Book	Transform	*
Small Business Accounts	Sinclair	*
Spectext	McGraw Hill	7
Spreadsheet	Microl	7
Stock Control	Hilderbay	*
Stock Control	Kemp	*
Stock Control	Transform	*
Tasword	Tasman	8
Tasword II	Tasman	9
Utility File	SD Micro	*
Word Processor	Microl	*
Word Processor	Quicksilva	2

Education

ABC Liftoff	Longman	*
Angle	Chalksoft	5
Angle Turner	Arnold Wheaton	7
Astro Maths	Scisoft	6
Blockbuster	Compusound	7
Castle	L'Ensouleiado	7
Castle of Dreams	Widgit	7
Castle Spellerous	Sinclair	8
Chess Tutor 1	Sinclair	7
Cortes	L'Ensouleiado	6
Countabout	Longman	*
Dyslexia Beater	Dunitz	8
Eiffel Tower	Chalksoft	6
Electronic Learner's Guide No. 1	ETST	6
French is Fun	CDS	5
French Mistress	Kosmos	*
French Voc Test	Tutorial	*
German is Fun	CDS	8
German Master	Kosmos	*
Guitar Tutor 1	Harlequin	*
Guitar Tutor 2	Harlequin	*
Handwriting	Chalksoft	*
Hotline	Chalksoft	5
Humpty Dumpty	Widget	8
Inkosi	Chalksoft	5
Jungle Jumble	Clever Cloggs	*
Jungle Maths	Scisoft	*
Learn to Read 1-5	Sinclair	7
Letters and Numbers	Jimjams	*
Linkword	Silversoft	6
Look Sharp	Mirrorsoft	7
Magnets	Sinclair	*
Make-a-Chip	Sinclair	*
Mansfield Park	Sussex	7
Mathskills II	Griffin	7
MDA-PCSS	MDA Assoc.	7
Model Maths	Jive	*
Mr T's Measuring Games	Ebury	7
Mr. Men	Mirror	*
Musicmaster	Sinclair	6
Nineteenth C. England	Sussex	8
O Level Chemistry	Calpac	*
O Level Physics	Think Tank	*
Party Time	C. Tutor	*
Pathfinder	Widget	7
Pirate	Chalksoft	7
Quick Thinking	Mirrorsoft	*
Sequences	Chalksoft	5
Spanish Gold	Chalksoft	*
Speak and Spell	S and G	*
Speech Marks	Sinclair	7
Spelling Bee	Image Systems	5
Star Reader	Scisoft	*
Startrucker	Widget	7
Teacher Data	B Farris	8
Tense French	Sulis	7
Time Traveller	Willey	*
Tuner	Soft Cottage	*
Whizz Kid	Comp. Tutor	*
Wizard Box	Scisoft	*
Zoo	L'Ensouleiado	6

Language

Forth	Melbourne House	9
Forth	Sinclair	7
48/80 Forth	E London	
Logo	Sinclair	9
Micro Prolog	Sinclair	8
Pascal Compiler	Hi-Soft	*
Snail Logo	CP	8
Spec. Forth	Abersoft	9
Spec. Forth	CP	8
ZX Forth	Artic	8

Practical

Beamscan	Beamscan	9
Computer Cookbook	Bug Byte	5
Cricket Averages	Spartan CC	7
Diet	dk'tronics	*
Diet Master	Diet Master	6
Dietician	Keysoft	4
Engine Diagnostic	Spectrasoft	*
First Aid	Eastmead	4
Football Pools	Hartland	*
How Long have you got?	Eastmead	6
I Ching	Salamander	7
I Ching	Sirius	*
Personal Reminder	SD Micro	*
Spectadraw 2	McAlley	*
Star Gazer	CRL	8
The Complete Guide to Medicine	Eastmead	4
Vega-Table	Vega	7
World Info	Wimsoft	*

Puzzle

Arcturus	Visions	7
Computaword	Work Force	2
Flix	Softricks	7
Hanoi King	Contrast	*
Jumbly	dk'tronics	*
Mazecube	PAL	6
Stuart Henry's Pop Quiz	Bellflower	7
3D Strategy	Quicksilva	8

Simulation

Ashes	Pulsonic	7
Cricket Captain‰Allanson		6
Fighter Pilot	Digital Integration	*
Flight Simulation	Sinclair	6
Full Throttle	Micromega	8
Golf	dk'tronics	*
Howzat	Wyvern	8
Inkos	Chalksoft	*
Match Point	Sinclair	9
New Birkdale	Hornby	8
Olympics	CRL	6
Royal Birkdale	Ocean	8
Strike Attack	Micromart	4
Super Soccer	Winters	4
Test Match	Comp. Rentals	6
The Forest	Phipps	*
The Forest	Phipps	7
Troon	Hornby	8
United	CCS	4
World Cup Football	Artic	7

Strategy

Airline	CCS	7
Angler	Virgin	6
Apocalypse	Red Shift	*
Battle 1917	CCS	8
Battle of Britain	Microgame	*
Brewery	CCS	8
British Lowland	CCS	*
Caribbean Trader	E. Midland	7
Conflict	Martech	*
Conquest	Cheetahsoft	6
Dix Mille	CCS	5
Fall of Rome	ASP	6
Football Manager	Addictive Games	7
Galaxy Conflict	Martech	*
Galaxy Conflict	Martech	8
Gangsters	CCS	8
Gatecrasher	Quicksilva	7
General Election	Bug-Byte	1
Golf	Virgin	7
Great Britain Ltd	Hessel	7
Hunter Killer	Protek	9
It's Only Rock 'n' Roll	K-Tel	5
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King Arthur	E. Midland	*
Millionaire	Incentive	7
Mugsy	Melbourne House	8
New Venture	Falcon	4
1984	Incentive	7
Oligopoly	CCS	7
Plunder	CCS	8
Red Weed	Lothlorien	7
Reichswald	MW Gamesworld	3
Scatterbrain	Manor	7
Sheepwalk	Virgin	7
Special Operations	Lothorien	8
Spectrealm	Runesoft	6
Star Trader	Bug-Byte	6
Stonkers	Beau Jolly	9
Super-League	Cross	6
Tradewind	WDS	*
War 70	CCS	8
Warlord	Lothlorien	*
Whodunnit	CCS	8
Wilfred the Hairy	Microbyte	2

Traditional

Arcturus	Visions	7
Backgammon	CP Software	7
Brag	T Lebon	7
Bridge Master	Serim	7
Bridge Player	CP Software	8
Bullseye	Mastertronic	4
Derby Day	CRL	5
Do Not Pass Go	Work Force	6
Double Dealer	MFM Software	5
Draughts	CP Software	7
Evolution	Microsphere	*
Go To Jail	Automata	*
Grid run/Pontoon	Arcade	*
Mind Games	Oasis	7
Original Superchess	CP Software	*
Pontoon	Contrast	3
Ramopoly	J Fletcher	*
Roulette	Dymond	*
Scrabble	Sinclair	8
Snooker	Visions	*
Super Bridge	Buffer Micro	7
Superchess II	CP Software	8
Superchess III	CP Software	9
The Turk	OCP	8
Voice Chess	Artic	9
Yahtzi	Work Force	*
Yatzee	CP Software	5
ZX Draughts	CP Software	7
ZX Reversi	CP Software	7
ZX-Chess II	Artic	*

Utility

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Assembler	Artic	6
Beyond Basic	Sinclair	5
Building Price	J Redman	6
Cartoon Animation	Fowler	*
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Compiler	Softek	6
Composer	Contrast	2
DLAN	Campbell	*
FP Compiler	Softek	9
Games Designer	Quicksilva	7
HURG	Melbourne House	8
Keyword Extension	Timedata	8
Linked Software: Information Handling	McGraw Hill	3
List File	SD Micro	*
Make Music	Buffer Micro	8
Melbourne Draw	Melbourne House	7
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Spectre Mac/Mon	Oasis	8
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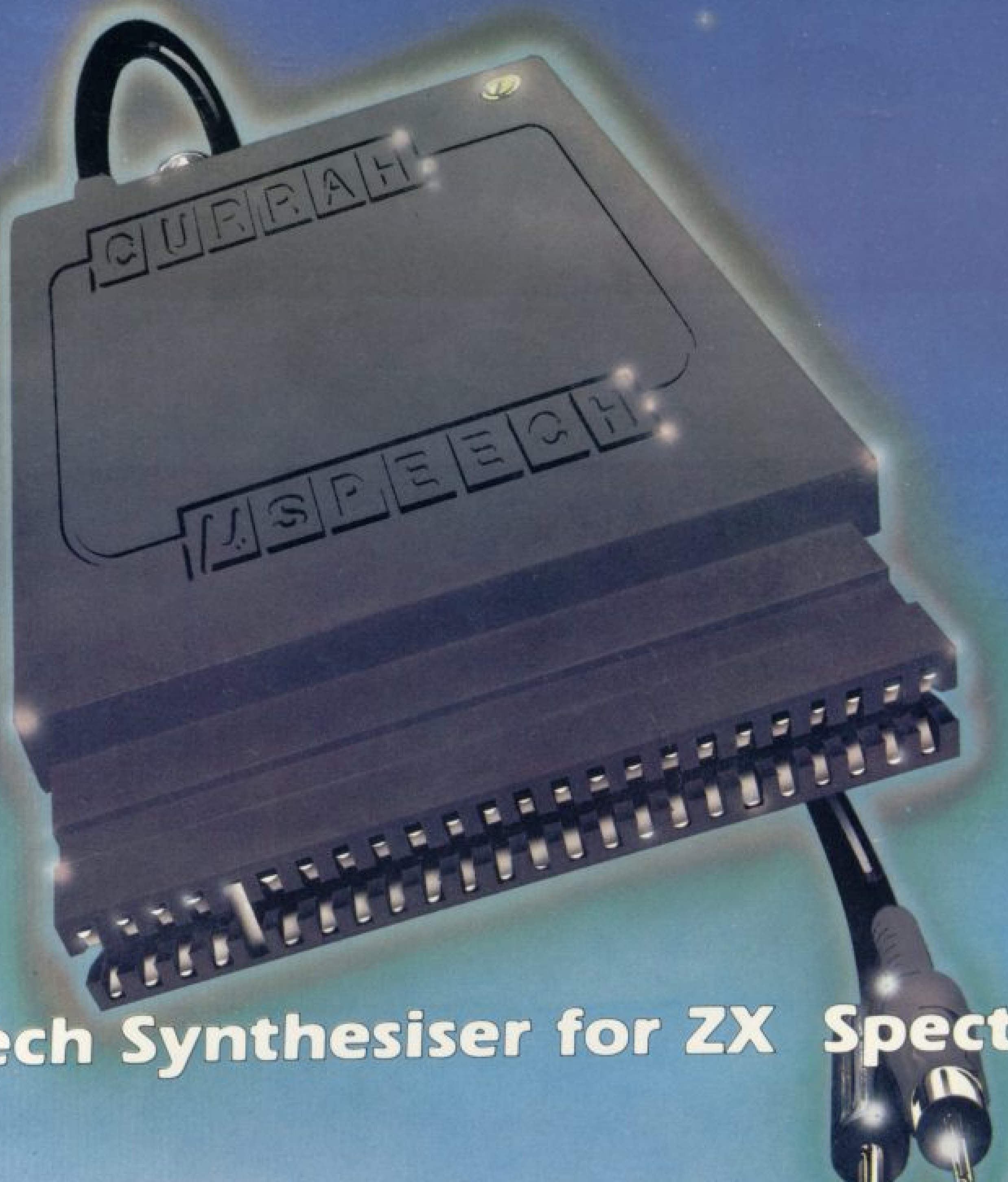
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